

# Analysis on mental health status and needs of health care workers in designated medical institutions of tuberculosis during the epidemic period of COVID-19

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## Research Article

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# Abstract

**Objective** To understand the mental health status and needs of the health care workers during the epidemic period of COVID-19, so as to provide scientific basis for the targeted intervention measures.

**Methods** A total of 511 health care workers were randomly selected from two designated tuberculosis medical institutions in Anhui province.

**Results** There were 139 people in epidemic prevention and control positions (27.20%). Depression level: female was higher than male; nurse was higher than doctor; middle and junior job titles were higher than senior titles; junior college degree or below were higher than bachelor's degree, master's degree and above; isolation ward, fever clinic and pre-check triage were significantly higher than those of non-prevention and control positions ( $P < 0.05$ ). Loneliness scores: doctors were higher than that of medical technicians, and isolation ward, fever clinic and pre-check triage were higher than those of non-prevention and control positions ( $P < 0.05$ ). Social support: doctors were lower than that of medical technicians, and isolation ward, fever clinic and pre-check triage were significantly lower than those of non-prevention and control positions ( $P < 0.05$ ). The score of social support was negatively correlated with depression and loneliness ( $P < 0.001$ ), while depression was positively correlated with loneliness ( $P < 0.001$ ). Health care workers most want to receive one-to-one psychological counseling (29.75%), and provide crisis management (24.07%). The awareness rate of health care workers on COVID-19's knowledge was relatively high.

**Conclusions** The psychological problems of health care workers, especially women, nurses with low educational background, low professional title, and staff in the epidemic prevention and control positions are relatively serious. We should focus on this population, and take targeted intervention measures.

## 1. Introduction

The Coronavirus Disease 2019 (COVID-19), formerly referred to as 2019 Novel Coronavirus (2019-nCoV) is a new respiratory virus that was first identified in Wuhan of Hubei Province, China in December, 2019. COVID-19 can result in severe and even fatal respiratory diseases such as acute respiratory distress syndrome<sup>[1]</sup>. It is similar to Severe Acute Respiratory Syndrome coronavirus (SARS-CoV) virus in its pathogenicity, clinical spectrum, and epidemiology<sup>[2]</sup>. The COVID-19 epidemic spreads very quickly. It took only 30 days to expand from Hubei province to the rest geographical locations of China Mainland. With many people returning from a long holiday, China needs to prepare for the possible rebound of the epidemic<sup>[3]</sup>. At present, COVID-19 cases have also appeared in many overseas countries and regions, the spread of COVID-19 in South Korea, Italy, Iran and Japan has become the greatest concern. Worldwide, more than 100 000 cases of COVID-19, and more than 3500 deaths have been reported. COVID-19 is thought to have higher mortality than seasonal influenza, even as wide variation is reported<sup>[4]</sup>.

Health care workers are at high risk of COVID-19 infection, a study by Wu et al<sup>[5]</sup> showed that a total of 72314 cases have been reported nationwide by February 11, 2020, of which 44,672 cases have been confirmed. Of all the confirmed cases, there were 1716 health workers (3.8%), of which 14.8% of the confirmed cases were diagnosed as severe or critical cases, and 5 cases died. Another study showed that<sup>[6]</sup> front-line health care workers are prone to psychological problems in public health emergencies. COVID-19 is a new type of infectious disease. At present, there is a lack of effective drugs for this disease, as the main force in the fight against the epidemic, health care workers are prone to all kinds of psychological problems in the face of high-intensity and high-risk work. Two recent studies in China both revealed that the incidence of anxiety and stress disorder is high among health care workers who were treating patients with COVID-19 infection during the epidemic period<sup>[7-8]</sup>. The National Health Commission issued a public document requiring<sup>[9]</sup> that all localities should strengthen the psychological crisis intervention and guidance of health care workers. But at present, there are few studies on the mental health of health care workers in both epidemic prevention and control positions and non-epidemic prevention and control positions. Therefore, in order to know the mental health level of health care workers in time, and take targeted intervention measures, this study investigated the mental health status and needs of health care workers in two provincial tuberculosis designated hospitals (designated medical institutions to combat the epidemic situation of COVID-19) in Anhui Province, which is of great significance to improve the mental health level of health care workers and better carry out the work of fighting against the epidemic situation.

## 2. Objects And Methods

### 2.1 Objects

The method of random sampling was applied to select health care workers from different positions from two provincial tuberculosis designated medical institutions in Anhui province, and a questionnaire survey was conducted. A total of 540 questionnaires were distributed and 511 valid questionnaires were collected, with an effective rate of 94.63%.

### 2.2 Questionnaire investigation

A questionnaire survey was conducted among the selected health care workers, including: (1) Basic demographic characteristics, including gender, age, occupation, job title, education level, marital status and positions during epidemic prevention and control, etc. (2) COVID-19 related knowledge: including the source of infection, the route of transmission, the susceptible population and the main clinical symptoms, etc. (3) Perceived Social support scale (PSSS): The scale was compiled in 1987<sup>[10]</sup>, revised by Chinese scholars and widely applied in China, Cronbach's  $\alpha = 0.88$ <sup>[11]</sup>. It consists of 12 items, each of which is rated on a scale ranging from 1 to 7, and each item is randomly arranged, which is divided into three dimensions: family support, friend support and other support. The total support is the sum of the three dimensions, the higher the score, the higher the perceived social support<sup>[12]</sup>. (4) Self-rating Depression scale (SDS): the scale includes 4 groups: psycho-emotional symptoms, somatic disorders, psychomotor

disorders and psychological disorders of depression. The specific scoring method is as follows: each item is scored according to grades 1, 2, 3 and 4. The higher the score is, the more serious the degree of depression is, and the cumulative score was more than 40 points, which was judged as depression<sup>[13]</sup>. (5) ULCA loneliness scale: The scale was compiled and revised by Russell et al<sup>[14]</sup>, including 11 "lonely" positive order items and nine "non-lonely" reverse order items, the items with asterisks should be in reverse order, and then each item should be added. The higher the score, the higher the degree of loneliness<sup>[15]</sup>.

## **2.3 Statistic analysis**

The quantitative data were expressed as Mean  $\pm$  Standard deviation (Mean  $\pm$  SD), t-test was used to compare the quantitative data between the two groups, one-way ANOVA was used to compare the quantitative data among different groups, Pearson correlation analysis was used when the variables were in accordance with bivariate normal distribution. The test level was  $\alpha = 0.05$ . The investigation and experimental data were double input by EpiData 3.1 and analyzed by SPSS 23.0.

## **3. Results**

### **3.1 Basic situation of health care workers in designated medical institutions for tuberculosis**

A total of 540 questionnaires were distributed and 511 valid questionnaires were retrieved, with an effective rate of 94.63%. The average age of 511 respondents was  $31.19 \pm 6.62$ , including 88 males (17.22%), 423 females (82.78%), the proportion of nurses was the highest (57.34%), and the proportion of bachelor degree was the highest (70.65%). Also, there were 139 people in epidemic prevention and control posts, accounting for 27.20%, of which fever clinic and pre-check triage accounted for the highest proportion (9.59%), and 186 health care workers had depression, accounting for 36.40% (Table 1).

Table 1  
Basic situation of health care workers [n(%)]

<b>Characteristics</b>	<b>n(%)</b>
Gender	
Male	88(17.22)
Female	423(82.78)
Occupation	
Doctor	145(28.38)
Nurse	293(57.34)
Medical technology	73(14.28)
Job title	
Junior	336(65.75)
Intermediate	143(27.99)
Senior	32(6.26)
Education level	
Junior college and below	86(16.83)
Bachelor's degree	361(70.65)
Master's degree or above	64(12.52)
Marital status	
Unmarried	167(32.68)
Married	333(65.17)
Divorced or widowed	11(2.15)
Post	
Non-prevention and control post	372(72.80)
Isolation ward	16(3.13)
Fever clinic and pre-check triage	49(9.59)
Imaging and laboratory diagnosis	43(8.41)
Medicament	31(6.07)
Depressive state	

Characteristics	n(%)
Depression	186(36.40)
Non-depression	325(63.60)

### **3.2 Comparison of social support, loneliness and depression scores among medical workers of different genders, occupations, job titles and educational levels.**

There was no significant difference in the score of social support and loneliness among health care workers of different genders. The depression score of female was higher than that of male ( $P < 0.05$ ). One-way ANOVA showed that there were statistically significant differences in social support, loneliness and depression among different occupations. The scores of family support, friend support, other support and total support of doctors were significantly lower than those of medical technicians ( $P < 0.05$ ), the score of loneliness was higher than that of medical technicians ( $P < 0.05$ ), and the depression score of nurses was higher than that of doctors ( $P < 0.05$ ). The difference in the level of depression was statistically significant in terms of professional titles, the depression scores of intermediate and junior health care workers were significantly higher than those of senior titles ( $P < 0.05$ ). The depression scores of health care workers in junior college and below were higher than those with bachelor's degree or master's degree or above ( $P < 0.05$ ) (Table 2).

Table 2

Comparison of different genders, occupations, job titles and educational levels (Mean  $\pm$  SD)

Characteristics	Family support	Friends support	Other support	Total support	Loneliness	Depression
Gender						
Male	23.84 $\pm$ 3.59	23.20 $\pm$ 3.63	22.77 $\pm$ 3.81	69.82 $\pm$ 10.23	35.23 $\pm$ 11.20	34.27 $\pm$ 10.63
Female	23.91 $\pm$ 3.50	23.01 $\pm$ 3.59	22.75 $\pm$ 3.60	69.67 $\pm$ 9.83	37.28 $\pm$ 10.37	36.97 $\pm$ 9.55
<i>t</i>	0.17	0.47	0.04	0.13	1.67	2.37
<i>P</i>	0.862	0.639	0.97	0.901	0.096	0.018 <sup>****</sup>
Occupation						
Doctor	23.60 $\pm$ 3.50	22.83 $\pm$ 3.29	22.51 $\pm$ 3.58	68.94 $\pm$ 9.39	36.87 $\pm$ 11.26	35.46 $\pm$ 10.59
Nurse	23.74 $\pm$ 3.61	22.81 $\pm$ 3.78	22.54 $\pm$ 3.63	69.09 $\pm$ 10.19	37.73 $\pm$ 10.40	37.59 $\pm$ 9.73 <sup>*</sup>
Medical technology	25.15 $\pm$ 2.82 <sup>*</sup>	24.40 $\pm$ 3.11 <sup>*</sup>	24.11 $\pm$ 3.47 <sup>*</sup>	73.66 $\pm$ 8.77 <sup>*</sup>	33.84 $\pm$ 9.07 <sup>*</sup>	34.26 $\pm$ 7.63
<i>F</i>	5.58	6.20	6.05	7.00	4.04	4.60
<i>P</i>	0.004 <sup>****</sup>	0.002 <sup>****</sup>	0.003 <sup>****</sup>	0.001 <sup>****</sup>	0.018 <sup>****</sup>	0.01 <sup>****</sup>
Job title						
Junior	23.93 $\pm$ 3.51	23.15 $\pm$ 3.64	22.93 $\pm$ 3.53	70.03 $\pm$ 10.00	36.97 $\pm$ 10.64	36.74 $\pm$ 9.71 <sup>**</sup>
Intermediate	23.64 $\pm$ 3.63	22.63 $\pm$ 3.60	22.33 $\pm$ 3.62	68.60 $\pm$ 9.83	37.33 $\pm$ 10.21	37.13 $\pm$ 10.00 <sup>**</sup>
Senior	24.56 $\pm$ 2.93	23.72 $\pm$ 2.83	22.81 $\pm$ 4.50	71.09 $\pm$ 8.83	34.72 $\pm$ 10.96	31.38 $\pm$ 8.34
<i>F</i>	0.98	1.67	1.41	1.39	0.81	4.85
<i>P</i>	0.375	0.189	0.246	0.249	0.446	0.008 <sup>****</sup>
Education level						

Note. <sup>\*</sup>: Compared with doctors,  $P < 0.05$ ; <sup>\*\*</sup>: Compared with senior job titles,  $P < 0.05$ ; <sup>\*\*\*</sup>: Compared with junior college or below,  $P < 0.05$ ; <sup>\*\*\*\*</sup>: The result of t-test or one-way ANOVA,  $P < 0.05$ .

Characteristics	Family support	Friends support	Other support	Total support	Loneliness	Depression
Junior college or below	23.31 ± 3.65	22.73 ± 3.59	22.26 ± 3.67	68.30 ± 10.04	37.92 ± 10.18	39.02 ± 9.69
Bachelor's degree	24.02 ± 3.41	23.06 ± 3.61	22.78 ± 3.66	69.86 ± 9.79	36.75 ± 10.70	36.24 ± 9.59 <sup>***</sup>
Master's degree or above	24.00 ± 3.83	23.36 ± 3.54	23.30 ± 3.31	70.66 ± 10.19	36.63 ± 10.19	34.67 ± 10.50 <sup>***</sup>
<i>F</i>	1.45	0.57	1.54	1.21	0.46	4.16
<i>P</i>	0.236	0.565	0.215	0.300	0.633	0.016 <sup>****</sup>
<i>Note.</i> *: Compared with doctors, $P < 0.05$ ; **: Compared with senior job titles, $P < 0.05$ ; ***: Compared with junior college or below, $P < 0.05$ ; ****: The result of t-test or one-way ANOVA, $P < 0.05$ .						

### 3.3 Comparison of social support, loneliness and depression scores among health care workers of different positions.

There was no significant difference in the score of total social support between the health care workers in COVID-19 prevention and control posts and those in non-prevention and control posts, but the scores of loneliness and depression of health care workers in prevention and control posts were significantly higher than those in non-prevention and control posts ( $P < 0.05$ ). One-way ANOVA showed that there were statistically significant differences in the scores of social support, loneliness and depression in specific prevention and control posts. Among them, the score of social support of health care workers in isolation ward, fever clinic and pre-check triage were lower than those in non-prevention and control posts ( $P < 0.05$ ), while the scores of loneliness and depression were significantly higher than those in non-prevention and control posts ( $P < 0.05$ ), and the scores of depression even reached the diagnostic criteria. The social support of health care workers in imaging and laboratory diagnosis positions was higher than that of non-prevention and control posts ( $P < 0.05$ ). There was no statistically significant difference between Medicament and non-prevention and control posts in terms of social support, loneliness and depression (Table 3).

Table 3  
Comparison among health care workers of different positions (Mean  $\pm$  SD)

Characteristics	Family support	Friends support	Other support	Total support	Loneliness	Depression
Post						
Non-prevention and control post	24.00 $\pm$ 3.33	23.12 $\pm$ 3.33	22.72 $\pm$ 3.52	69.84 $\pm$ 9.27	36.24 $\pm$ 10.09	35.47 $\pm$ 9.25
Prevention and control post	23.64 $\pm$ 3.95	22.83 $\pm$ 4.22	22.86 $\pm$ 3.90	69.32 $\pm$ 11.40	38.78 $\pm$ 11.50	39.29 $\pm$ 10.62
<i>t</i>	0.95	0.74	0.38	0.48	2.44	3.99
<i>P</i>	0.345	0.461	0.707	0.634	0.015**	0.001
Specific post						
Non-prevention and control post	24.00 $\pm$ 3.41	23.12 $\pm$ 3.33	22.72 $\pm$ 3.52	69.84 $\pm$ 9.27	36.24 $\pm$ 10.09	35.47 $\pm$ 9.25
Isolation ward	21.13 $\pm$ 5.76*	20.56 $\pm$ 5.20*	20.81 $\pm$ 5.12*	62.50 $\pm$ 15.56*	46.81 $\pm$ 11.91*	45.00 $\pm$ 11.06*
Fever clinic and pre-check triage	22.59 $\pm$ 3.96*	21.27 $\pm$ 4.74*	21.41 $\pm$ 3.87*	65.27 $\pm$ 11.70*	43.57 $\pm$ 10.99*	44.55 $\pm$ 11.17*
Imaging and laboratory diagnosis	24.98 $\pm$ 3.41	24.44 $\pm$ 3.38*	24.49 $\pm$ 3.55*	73.91 $\pm$ 9.61*	34.05 $\pm$ 10.48	35.33 $\pm$ 8.62
Medicament	24.74 $\pm$ 2.19	24.23 $\pm$ 2.00	23.94 $\pm$ 2.13	72.90 $\pm$ 5.83	33.65 $\pm$ 7.66	33.55 $\pm$ 5.89
<i>F</i>	5.96	7.82	6.39	7.75	11.17	14.63
<i>P</i>	0.001	0.001	0.001	0.001	0.001	0.001
<i>Note.</i> *: Compared with non-prevention and control positions, $P < 0.05$ , **: The result of t-test, $P < 0.05$ .						

### 3.4 Correlation analysis of social support with depression and loneliness.

Family support, friend support, other support and total social support of health care workers were negatively correlated with the scores of depression and loneliness ( $P < 0.001$ ). Also, there was a significant positive correlation between the score of depression and the score of loneliness ( $P < 0.001$ ) (Table 4).

Table 4  
Correlation analysis of social support with depression and loneliness

Variables	Depression		Loneliness	
	r	P	r	P
Family support	-0.51	⊗0.001	-0.56	⊗0.001
Friends support	-0.49	⊗0.001	-0.58	⊗0.001
Other support	-0.47	⊗0.001	-0.57	⊗0.001
Total support	-0.53	⊗0.001	-0.62	⊗0.001
Depression	1	—	0.75	⊗0.001

### 3.5 The need for mental health and awareness rate of COVID-19 related knowledge among health care workers.

The top three psychological needs that health care workers were willing to accept were one-to-one psychological counseling (29.75%), psychological lectures (27.20%) and participating in interactive groups (18.59%). The top three psychological services needed were crisis event management (24.07%), emotional management (21.33%) and stress and frustration coping (21.13%). Most health care workers were willing to have psychological counseling during normal working hours (61.84%). The awareness rate of COVID-19 related knowledge was relatively high, the highest was the source of infection (100%), and the lowest was the clinical manifestation (93.54%). It shows that the understanding of COVID-19 related clinical manifestations among health care workers remains to be deepened (Table 5).

Table 5  
The need for mental health and awareness rate of COVID-19 [n(%)]

Characteristics	n(%)	Characteristics	n(%)
Psychological demand		Counseling time	
One-to-one counseling	152(29.75)	working period	316(61.84)
Psychological lecture	139(27.20)	weekend break	76(14.87)
interactive group	95(18.59)	lunch break	22(4.31)
Network counseling	90(17.61)	Other time	97(18.98)
Telephone counseling	35(6.85)	Awareness rate	
Service items		Infectious source	511(100.00)
Crisis event management	123(24.07)	Pathogen	510(99.80)
Emotional management	109(21.33)	Transmission route	510(99.80)
Stress and frustration coping	108(21.13)	Susceptible population	489(95.69)
Self-awareness and acceptance	78(15.26)	Clinical manifestation	478(93.54)
Interpersonal communication	59(11.55)		
Parent-child relationship	34(6.65)		

## 4. Discussion

COVID-19 has been listed as Class B infectious disease under the Law of Prevention and treatment of Infectious Diseases in China, and it is managed according to Class A infectious diseases. As an emerging infectious disease, much is still unknown about how the COVID-19 spreads, so it is easy to cause panic and psychological problems. A population-based cross-sectional study<sup>[16]</sup> explored the psychological reaction of people in China in the early stages of the COVID-19 outbreak, and found that the rates of moderate and severe anxiety among volunteers fighting the epidemic in were 32.7% and 20.4% in Wuhan and Shanghai, respectively, suggesting that during the rising stage of the outbreak, the physical and mental reactions of the masses were significant. In order to win this battle, the health care workers in China have made great efforts. As front-line personnel in the fight against the COVID-19 epidemic, they not only undertake heavy prevention and control tasks, but also bear tremendous psychological pressure.

Studies have shown that there is a significant positive correlation between depression and loneliness, 36.4% of health care workers had depression, which was higher than that reported in a previous study by Qi et al<sup>[17]</sup>, and the depression scores of health care workers with lower job title and educational background were higher. The score of loneliness of doctors was higher than that of medical technicians, the scores of depression and loneliness of health care workers in isolation ward, fever clinic and pre-

check triage were higher than those of non-prevention and control posts, It shows that the psychological problems of doctors, especially doctors with low job titles and academic qualifications, as well as those in epidemic prevention and control positions are relatively serious. Shao et al<sup>[18]</sup> found that during the period of fighting against SARS, the mental health level of health care workers was lower than the domestic norm, and there were mental health problems such as anxiety, fear, etc. And doctors, especially health care workers in prevention and control posts such as isolation wards and fever clinics, rushed to the front line of the epidemic. Due to the high infectivity and unknown nature of the new coronavirus, problems encountered in clinical work could not be solved in time, and there is no one to talk to in the face of the pressure of the epidemic, and there is no psychological comfort. In particular, some doctors are directly engaged in the diagnosis and treatment of COVID-19 in the isolation ward, and they are in a state of isolation for a long time and cannot be reunited with their families, but also worried about the risk of family infection, making them feel lonely and helpless, extremely prone to psychological problems.

In addition, this study found that depression had statistically significant differences in gender, occupation, professional title, education level and different positions. Among them, the depression score of nurses was higher than that of doctors. Qi et al<sup>[17]</sup> found that clinical nurses have psychological problems in the special period of facing COVID-19, another study by Jiao et al<sup>[19]</sup> shows that in the fight against the epidemic, nurses have a high intensity of tasks, as well as greater physical and mental pressure. There are several reasons that might cause this situation, first of all, during the fight against the COVID-19 epidemic, nurses work intensively, have heavy tasks, and are in a state of physical and mental exhaustion. Secondly, some nurses work at front line in COVID-19 fight, thus they have a high probability of contact with infected patients, and face the risk of being isolated at any time. Moreover, COVID-19 is highly contagious and has various clinical manifestations, so there is no specific drug at present, and the drugs previously used to treat other coronaviruses may be effective, but they need to be verified by further clinical trials<sup>[20]</sup>. Therefore, in the face of many uncertainties, clinical nurses are prone to varying degrees of psychological problems, such as depression, anxiety, etc. At the same time, the lack of in-depth understanding of COVID-19 aggravates the fear of nurses.

This study suggests that the social support of health care workers was negatively correlated with the scores of depression and loneliness. Further analysis of the social support of health care workers is particularly important for a comprehensive understanding of mental health status. Among them, the scores of social support of health care workers in prevention and control positions were lower. The reason is that doctors in prevention and control positions, are more likely to come into contact with COVID-19 patients, and there is a risk of infection. Their family and friends may be worried about being infected and have low support for them. In the absence of social support, health care workers tend to choose negative coping styles, such as self-attack and retreat, thus affecting their mental health<sup>[21]</sup>. Therefore, close attention should be paid to improving the psychological coping ability of health care workers under stress<sup>[22]</sup>, in order to enhance their mental health level, and then carry out epidemic prevention and control work more effectively.

In the face of the psychological problems that need to be solved urgently, this study continues to investigate the psychological needs of health caregivers, in order to provide a better solution for hospital management and improve mental health. The following reference improvement measures are obtained from the study, such as mental health lectures, psychological counseling and psychological guidance for them, because healthy psychological counseling can maintain a positive and stable state of mind to deal with unexpected situations and reduce the risk of mental disorders such as anxiety and depression<sup>[23]</sup>. In addition, it is also very important to actively care for the families of health care workers and make them feel at ease with their work. It is suggested that managers should communicate more, understand their difficulties encountered in work and life, give timely help, improve their family conditions and reduce their life stress<sup>[24]</sup>.

Mental health is not only related to individual health, but also affects social function and professional ability<sup>[25]</sup>. During the fight against COVID-19, health care workers, as front-line personnel in the fight against the epidemic, face both physical and mental pressure. The quality of their work is not only related to the life safety of patients, but also related to whether the epidemic can be effectively controlled and social stability. Therefore, we should actively take mental health intervention measures for health care workers according to the psychological needs of them. This study points out that the health care workers who need to pay attention to during the epidemic can provide reference for the prevention and management of public health emergencies.

## 5. Conclusion

During the epidemic period of COVID-19, the psychological problems of health care workers, especially women, nurses with low educational background, low professional title, and staff in the epidemic prevention and control positions are relatively serious, and targeted intervention measures could be taken according to their psychological needs to improve their mental health.

## Declarations

### **Ethics approval and consent to participate**

This study was approved by the Ethics Committee of Anhui Provincial Chest Hospital (K2020-004). The informed consent was obtained from all participants before investigation.

### **Consent for publication**

Not applicable.

### **Availability of data and materials**

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

## Competing interests

The authors declare no conflict of interest.

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## Authors' contributions

X-HF and LW contributed equally to this work. X-HF, LW, G-CW, D-CM and Y-JX conceived a conceptual framework for research; investigation: L-SL, HW and Y-JX; data analysis: X-HK; writing—original draft preparation: X-HF and LW; writing—review and editing: LW and G-CW; supervision: G-CW and D-CM. The authors all approved the final versions for submission.

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