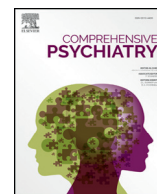




Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Elsevier hereby grants permission to make all its COVID-19-related research that is available on the COVID-19 resource centre - including this research content - immediately available in PubMed Central and other publicly funded repositories, such as the WHO COVID database with rights for unrestricted research re-use and analyses in any form or by any means with acknowledgement of the original source. These permissions are granted for free by Elsevier for as long as the COVID-19 resource centre remains active.



The mental state and risk factors of Chinese medical staff and medical students in early stages of the COVID-19 epidemic

Shuang Wu^{a,1}, Zhe Li^{b,1}, Zhixiong Li^c, Weiyi Xiang^d, Yiwen Yuan^b, Yaya Liu^{b,e}, Zhenzhen Xiong^{a,*}

^a School of Nursing, Chengdu Medical College, Chengdu, Sichuan 610083, China

^b Mental Health Center and National Clinical Research Center for Geriatrics, West China Hospital, Sichuan University, Chengdu, Sichuan 610041, China

^c The Third Department of Clinical Psychology, Karamay Municipal People's Hospital, Karamay, Xinjiang 830054, China

^d The West China College of Medicine, Sichuan University, Chengdu 610041, China

^e Zun Yi Psychiatric Hospital, Zunyi, Guizhou 563000, China

ARTICLE INFO

Keywords:
SARS-CoV-2
COVID-19
Serious Mental Illness
Medical staff
Medical students

ABSTRACT

Objective: This study aimed to investigate the mental state of medical staff and medical students in the early stages of the SARS-CoV-2 outbreak, as well as analyze the risk factors of serious mental illness (SMI), so as to provide a scientific basis for further psychological intervention and management.

Method: A cross-sectional survey was conducted from February 2–7, 2020. The Kessler 6 Psychological Distress Scale and a general information questionnaire were administered on-line to a convenience sample of 548 medical staff and medical students in China. Multivariate binary logistic regression analysis was used to screen the risk factors of SMI in medical staff and medical students.

Results: Of the 505 respondents in the final analysis, 188 (37.23%) were at high risk of SMI. Respondents were at significantly higher risk of SMI if they had been suspected of being infected with the SARS-CoV-2 (OR = 7.00, 95% CI: 1.19–41.14), had relatives suspected of being infected with the SARS-CoV-2 (OR = 23.60, 95% CI: 1.11–501.30), felt concerned towards media coverage of outbreak-related information (OR = 11.95, 95% CI: 3.07–46.57), recently dreamed related to SARS-CoV-2 (OR = 4.21, 95% CI: 2.22–8.01), experienced difficulty in controlling emotions during SARS-CoV-2 epidemic (OR = 3.25, 95% CI: 1.66–6.37), or spent hours watching outbreaks per day (OR = 1.29, 95% CI: 1.13–1.46).

Conclusion: Our findings highlight that medical staff and medical students were vulnerable to SMI during the early stages of the SARS-CoV-2 outbreak and identify the factors associated with SMI which can be used to formulate psychological interventions to improve the mental health. The independent risk factors for SMI among them are suspicion that they or relatives were infected with the SARS-CoV-2, greater interest in media reports about the epidemic, frequency of recent dreams related to SARS-CoV-2, difficulty in controlling emotions during the epidemic, and hours spent watching outbreaks per day.

© 2020 The Authors. Published by Elsevier Inc. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

1. Introduction

Outbreaks of infectious diseases remain a major problem worldwide. They have substantial impacts not only on medical treatment, the economy, and society, but also on the psychological health of healthcare workers, which has become a prominent public health problem [1–3]. The novel coronavirus, designated 2019-nCoV and later SARS-CoV-2, is one of the most challenging threats to public health in China and in many other regions around the world. As of July 17th, 2020, 13,616,593 cases were reported and 585,727 deaths with a case fatality

rate of 5.1% [4]. Due to its high incidence, strong risk of contagion and asymptomatic transmission, the epidemic situation is severe, and control is difficult, leading to the strictest prevention and control measures [5,6]. With widespread work stop-offs, school suspensions and the shortage of protective materials, this SARS-CoV-2 epidemic exceeds the coping ability of individuals and society, causing anxiety and panic around the world. Recent studies found that 53.8% of the general population rated the psychological impact of the outbreak as moderate to severe stress (8.1%), anxiety (28.8%), and depression (16.5%) during the initial phase and showed no significant changes after 4 weeks during the COVID-19 epidemic in China [7,8]. Serious worries about their physical health, anger and impulsivity and intense suicidal ideation were significantly higher in psychiatric patients than people without psychiatric illnesses [9]. Psychological impacts may be substantial, especially for healthcare professionals on the frontline of the epidemic. Reports

* Corresponding author at: School of Nursing, Chengdu Medical College, No. 601 Tian Hui Road, Rong Du Avenue, Chengdu, Sichuan 610083, China.

E-mail address: xiongzhenzhen@cmc.edu.cn (Z. Xiong).

¹These authors contributed equally to this work.

suggested a large number of healthcare workers suffered moderate to severe depression (8.1%–8.9%), anxiety (14.5%–28.8%) and stress (6.6%–16.5%) in Singapore and India during the outbreak [10,11]. Mental health among medical students may also be in danger, which may impact our ability to control current and future epidemics.

Previous studies have suggested that new infectious diseases are important stressors that cause physical, psychological, and behavioral disorders [12]. During any outbreak of a new infectious disease, medical personnel are at the highest risk of exposure. Overwork and anxiety about being infected may increase the risk of psychological problems among medical staff. A survey in China showed 12.5% of medical staff experienced high levels of anxiety and depression, especially those with direct clinical contact with infected people [13]. In addition, many healthcare workers had poorer sleep quality due to the call of professional duty which may lead to high risk of mental illness [14].

University students are at high risk of psychological disorders, particularly when facing medical emergencies [15]. Although medical students have some medical training, their lack of clinical experience, particularly during emergency situations, makes it difficult and stressful for them to make decisions during epidemics [16–18]. Therefore, understanding their psychological state during an epidemic may help us better train medical students in the future.

The present study investigated the psychological state of medical staff and medical students during the early stages of SARS-CoV-2 epidemic. The results are aimed at increasing the awareness of psychological impacts of infectious disease outbreaks on medical staff and medical students, and providing a scientific basis for the development of targeted psychological interventions and training programs.

2. Methods

2.1. Research subjects

Medical staff and medical students were enrolled in this study. The snowball sampling method was used to invite subjects. All invitees completed the questionnaire online via Questionnaire Star (<https://www.wjx.cn>). The initial set of invitees (10 medical staff, 10 medical students) was chosen to ensure broad representation of age, gender, academic or medical specialty, medical or academic institution, education level, and city. This set of invitees then forwarded the questionnaire to 10 colleagues and 10 classmates whom they considered suitable for the survey, and this second set forwarded the questionnaire in the same way.

Inclusion criteria for medical staff were: (1) currently engaged in clinical work, (2) holding a valid license for medical practice, and (3) having signed informed consent. Inclusion criteria for medical students were: (1) currently enrolled in a university or medical institution at any educational level (college, undergraduate or graduate), and (2) having signed informed consent. Respondents were excluded if medical staff or medical students had been diagnosed with any DSM-IV (Diagnostic and Statistical Manual of Mental Disorders, 4th edition) disorder before this survey.

According to the sample size estimation method of multiple factors analysis, the sample size should at least 5–10 times for influence factors [19]. In this survey, we could identify approximately 20 influencing factors. The 10 times of 20 is 200. We also added the 20% missing rate. The minimal sample size in the survey was 220.

2.2. Experimental protocol

A cross-sectional survey was conducted from February 2–7, 2020. The study was approved by the ethics committee of West China Hospital, Sichuan University and informed consent was obtained through the Web-based surveys. We used the platform Questionnaire Star (<https://www.wjx.cn>) to prepare and deliver surveys. A general information questionnaire, developed for the present study based on literature

review and expert consultation, asked about general demographic information, epidemic occurrence in the place of residence, family relationships, infection status of the respondent and his or her family members, and amount of time spent daily following the SARS-CoV-2 epidemic. Subjects also completed the Kessler 6 Psychological Distress Scale (K6), which asked about six psychological symptoms, including “felt nervous”, “hopeless”, “restless or fidgety”, “depressed”, “felt that everything was an effort”, and “worthless” [20,21]. Responses were scored according to the frequency of symptoms: “0” (none of the time), “1” (a little of the time), “2” (some of the time), “3” (most of the time), and “4” (all of the time). Scores on the scale can range from 0 to 24 [22]. Based on their total score, subjects were categorized as probably not having SMI (scores 0–12) or having probable SMI (scores 13 or more) [23]. Previous studies have indicated that the Chinese version of the scale has good reliability and validity [24,25].

2.3. Statistical analysis

Data were double-entered into the Statistical Package for the Social Sciences (SPSS for Windows, version 25.0; IBM, Chicago, IL). Age, K6 score, and time spent daily paying attention to the epidemic were not normally distributed, so data were presented as median and interquartile range. Qualitative data were presented as frequency and percentage. We divided the participants into two subgroups according to a cut off score of 12/13 on the K6. Then univariate comparisons were made between the two subgroups (high or low risk of SMI), and the comparisons were assessed for statistical significance using Wilcoxon signed rank test (continuous data) or the chi-squared test (binomial data). In the logistic model, a binary coding of psychological distress was used in which high risk of SMI = 1 (K6 scores of 13 or greater) and low risk of SMI = 0 (K6 scores of 12 or less). Simple binary logistic regression and backward stepwise multiple logistic analyses were performed to identify factors influencing high risk of SMI. The variables which had significantly difference ($P < 0.05$) in univariate comparisons were entered into the model initially, with the least significant variables removed one at a time until only significant variables associated with values of $P < 0.05$ remained. All statistical tests were two-tailed.

2.4. Quality control

The same IP address could be used only once to complete the questionnaire, which did not collect any personal information such as names in order to ensure anonymity and therefore honest responses. The time spent on each questionnaire was monitored automatically. In the preliminary experiment, 15 medical staff and 15 medical students were required to answer each question carefully. The shortest time to answer the questionnaires was 120 s. In order to guarantee the authenticity of the questionnaire, those completed in fewer than 120 s were rejected as invalid.

3. Results

A total of 548 questionnaires were received from medical staff and medical students. 331 questionnaires were received from medical staff, of which 304 were valid (91.84%), 27 cases excluded because they completed in fewer than 120 s. While 217 were received from medical students, of which 201 were valid (92.63%), 16 cases excluded because they completed in fewer than 120 s.

In total, 505 respondents completed the online survey. Their average age was 28 years old, and 68.12% were female. More than a half of the sample (53.86%) were unmarried. A total of 17.03% of the respondents lived in Hubei province. Forty percent of the respondents visited Wuhan or contacted with people from Wuhan in previous month. Only 0.40% of respondents reported poor in family relationship and the evaluation of their own health were 75.45% for good. 25.35% of the respondents had experienced outbreaks in their residential

communities. 34.26% of respondents suspected of being infected and their relatives suspected of being infected reported 31.49%. Only 38.02% of the respondents had no difficulty in controlling emotions during the current epidemic. The frequency of recent dreams related to SARS-CoV-2 were 38.02% reported frequent. As for concerns towards media coverage of outbreak-related information, 83.76% of the respondents reported very concerned. The topics of greatest concern were prevention (15.60%), outbreak report (24.20%), research progress (58.20%) or others (2.00%). The times they spent watching outbreaks per day was 3 h on average. The majority of respondents (87.13%) agreed that mental state was very important in dealing with the epidemic. Only 7.90% of all respondents showed relaxed in current mental state. The median score of K6 revealed 7. 37.23% of the whole sample (medical staff and medical students) reported high risk of SMI (Supplementary table 1). Respectively, 14.14% of 304 medical staff and 72.14% of 201 medical students reported high risk of SMI.

Students or staff classified as being at low or high risk of SMI based on K6 score did not differ significantly in sex or in whether they or relatives were infected with the SARS-CoV-2 (Table 1). At the same time, those at high risk spent more time watching outbreaks per day and were younger and more likely to be medical students, to live in Hubei, to have poor family relationships, to be unmarried, to have a history of contact with people from Wuhan, to have experienced an outbreak in their residential community, and to have suspected that they themselves or their relatives were infected with the new coronavirus. High-risk individuals were also more likely to report difficulty in controlling their emotions during the epidemic, to have dreams related to the SARS-CoV-2, to be more concerned about media reports of the epidemic, to experience more anxiety about the epidemic, and to agree with the idea that mental state is important in dealing with the epidemic.

Marriage, age, occupation, epidemic contact characteristics, perceived impacts of the epidemic and coping style were included in the multivariate analysis. Factors' values were listed in Supplementary table 2. The results indicated that suspected of being infected with the SARS-CoV-2 (OR = 7.00, 95% CI: 1.19–41.14), had relatives suspected of being infected with the SARS-CoV-2 (OR = 23.60, 95% CI: 1.11–501.30), felt concerned towards media coverage of outbreak-related information (OR = 11.95, 95% CI: 3.07–46.57), recently dreamed related to SARS-CoV-2 (OR = 4.21, 95% CI: 2.22–8.01), experienced difficulty in controlling emotions during SARS-CoV-2 epidemic (OR = 3.25, 95% CI: 1.66–6.37), or spent hours watching outbreaks per day (OR = 1.29, 95% CI: 1.13–1.46) were the risk factors of SMI (Table 2).

4. Discussion

In infection outbreaks or other major health events, medical staff experience occupational stress, anxiety about their own survival, and professional conflicts, all of which increase the risk of depression, anxiety, and trauma [10,11]. The present study used the K6 scale to investigate the mental health of medical staff and medical students during the current SARS-CoV-2 epidemic. We found that 188 individuals (37.23%) in this population were at high risk of SMI, which was much higher than the general population who reported moderate to severe depressive symptoms (16.5%), anxiety symptoms (28.8%), and stress (8.1%) as well as than other workforce returning to work who reported the prevalence of anxiety, depression, stress and insomnia were 3.8%, 3.7%, 1.5% and 2.3% respectively during the COVID-19 epidemic [7,26]. These findings suggest that the COVID-19 outbreak has substantially affected the mental health of Chinese healthcare workers and medical students. This implies the need for measures to strengthen and maintain their mental health during the epidemic. Health facilities may consider shorter work hours, regular rest periods and rotating shifts for staff who work in high-risk jobs [27]. The support from colleagues and supervisors and clear communication of directives and precautionary

measures can reduce psychiatric symptoms [28]. Confidence in infection control measures may also mitigate and facilitate adaptive stress response [29]. Although medical staff are considered one of the focus groups for psychological intervention, a previous study in Singapore found that nonmedical health care workers are at higher risk for psychological distress than medical personnel during the COVID-19 outbreak [10]. Reasons for this may include accessibility to formal psychological support, more first-hand medical information on the outbreak, more intensive training on personal protective equipment and infection control measures.

The risk of SMI among medical students (72.14%) was much higher than students in the health area who identified a prevalence of between 18.5% and 49.1% not during an epidemic or other crisis [30]. Due to the requirements of epidemic prevention and control, all schools have been closed since the implementation of the first-level defense measures, and students can't return to school [31]. Medical students tended to depend more on social media rather than scientific sources for obtaining situation reports or precautionary measures towards COVID-19 [32], which may lead to inaccurate assessment of the epidemic situation. Studies have confirmed that they pay close attention to the current epidemic situation, which can cause excessive stress and concern, which in turn can compromise their professional learning [33]. There is an urgency to redesign training programs and communication activities for a more effective dissemination of information related to the COVID-19 epidemic or epidemics in general [34]. A study in Hong Kong pointed out that during the SARS epidemic, medical and nursing students had greater levels of anxiety and psychological stress than non-medical students [16]. Those previous studies and the present work highlight the need to preserve the mental health of medical students as future medical staff who will become an important force in fighting new infectious diseases. Therefore, it is necessary for medical schools to use social media more frequently to disseminate knowledge and to develop training plans in early stages of public health emergencies [32], as well as providing psychological interventions such as cognitive behavioral therapy (CBT) and mindfulness based cognitive therapy (MBCT) online or smartphone based psychoeducation on the outbreak. CBT can enhance their ability to prevent depression episode by changing the schedule of their daily activities and manage anxiety with using relaxation techniques as well as mitigate maladaptive coping behaviours [35,36]. MBCT, which focuses on the use of various mindfulness meditation practices to cultivate non-judgemental awareness for the moment, has been proven to be helpful in reducing stress in people with physical conditions [37]. When it is hosted on online virtual platforms, MBCT could also be a method for medical students to provide peer support to each other and to share their challenges and resolutions during the outbreak to foster comradeship and resilience in them [27].

There was only one confirmed case of SARS-CoV-2 among the survey participants and their relatives, but 34.26% of them were suspected of being infected, and 31.49% of their relatives were suspected of being infected. During previous pandemics of new infectious diseases, medical staff were concerned about their own health and the risk of transmitting infection to their families [38–40]. The current study found similar results. The majority of participants (83.76%) were very concerned about the epidemic. While they spent a lot of time watching media about the epidemic, they reported not getting enough information about infection prevention and control. Respondents' concern may be related to the uncertainty over transmission routes and difficulty of prevention and control of the outbreak. The more often a new infectious disease is mentioned in the media, the more severe it is perceived to be [41]. This may be one reason why spending more time watching reports of the epidemic was associated with higher risk of SMI in our subjects.

In addition, we found that difficulty in controlling emotions during the epidemic and frequent dreams related to the virus were risk factors for SMI. A previous study showed an increase in the incidence of sleep disorders after medical staff were isolated from their families during

Table 1
Univariate analysis of factors potentially associated with risk of SMI among medical staff and medical students.

Characteristic	Risk of SMI		χ^2/Z	P
	Low	High		
Age	35(26–42)	20(19–23)	–12.60	<0.001
Hours spent watching outbreaks per day	2(1–3)	8(6.25–8)	16.37	<0.001
Sex			0.37	0.545
Male	98 (30.90%)	63 (33.51%)		
Female	219 (69.09%)	125 (66.49%)		
Married			113.68	<0.001
Yes	204 (64.35%)	29 (15.43%)		
No	113 (35.65%)	159 (84.57%)		
Current residence			18.32	<0.001
Hubei	20 (6.31%)	66 (35.11%)		
Non-Hubei	297 (93.69%)	122 (64.89%)		
Visited Wuhan or contact with people from Wuhan in previous month?			230.51	<0.001
Yes	46 (14.51%)	156 (82.98%)		
No	271 (85.49%)	32 (17.02%)		
Outbreak in your community?			31.09	<0.001
Yes	54 (17.03)	74 (39.36%)		
No	263 (82.97%)	114 (60.64%)		
Family relationship			12.79	0.002
Good	289 (91.17%)	186 (98.94%)		
Average	26 (8.20%)	2 (1.06%)		
Poor	2 (0.63%)	0 (0.00%)		
Evaluation of own health			41.67	<0.001
Good	209 (65.93%)	172 (91.49%)		
Average	59 (18.61%)	8 (4.26%)		
Poor	49 (15.46%)	8 (4.26%)		
Infected with SARS-CoV-2?			0.59	0.441
Yes	1 (0.32%)	0 (0.00%)		
No	316 (99.68)	188 (100)		
Suspected of being infected with SARS-CoV-2?			329.60	<0.001
Yes	15 (4.73%)	158 (84.04%)		
No	302 (95.27%)	30 (15.96%)		
Relatives infected with SARS-CoV-2?			0.59	0.441
Yes	1 (0.32%)	0 (0.00%)		
No	316 (99.68%)	188 (100%)		
Relatives suspected of being infected with SARS-CoV-2?			375.78	<0.001
Yes	2 (0.63%)	157 (83.51%)		
No	315 (99.37%)	31 (6.49%)		
Difficulty in controlling your emotions during SARS-CoV-2 epidemic			215.49	<0.001
Not difficult	190 (59.94%)	2 (1.06%)		
Difficult	40 (12.62%)	9 (4.79%)		
Very difficult	87 (27.44%)	177 (94.15%)		
Frequency of recent dreams related to SARS-CoV-2			296.25	<0.001
Almost never	244 (76.97%)	10 (5.32%)		
Sometimes	41 (12.93%)	18 (9.57%)		
Frequent	32 (10.09%)	160 (85.11%)		
Concern towards media coverage of outbreak-related information			51.08	<0.001
Less concerned	27 (8.52%)	2 (1.06%)		
Concerned	53 (16.72%)	0 (0.00%)		
Very concerned	237 (74.76%)	186 (98.94%)		
Importance of mental state in dealing with the epidemic			37.38	<0.001
Not important	23 (7.26%)	0 (0.00%)		
Important	40 (12.62%)	2 (1.06%)		
Very important	254 (80.13%)	186 (98.94%)		
Current mental state			33.00	<0.001
Relaxed	40 (12.62%)	0 (0.00%)		
No change	126 (39.75%)	1 (0.53%)		
Worried	151 (47.60%)	187 (99.50%)		

the MERS outbreak [42]. Long-term emotional distress and sleep disturbance can seriously affect the quality of life and work. For example, medical staff affected by SARS had a higher incidence of psychological distress and absence from work after the epidemic than before it [36].

The main limitation of this study is that there was only subjective assessment and a lack of objective assessment. There was also lack of control and objective assessment in the study. A potential selection bias existed in our online survey and it is one of the limitations of the present study. Another limitation of the present study, our study design was cross-sectional and so could not capture changes in SMI and its predictors over the course of the COVID-19 outbreak.

5. Conclusion

Medical staff and students were at high risk of experiencing SMI during the early stages of the SARS-CoV-2 outbreak. The independent risk factors for SMI among them are suspicion that they or relatives were infected with the SARS-CoV-2, greater interest in media reports about the epidemic, frequency of recent dreams related to SARS-CoV-2, difficulty controlling emotions during the epidemic, and hours spent watching outbreaks per day. This suggests that medical students and staff, especially who pay more attention to the epidemic, should be taught active coping strategies.

Table 2
Analysis of independent risk factors for SMI among medical staff and medical students.

Factor	Regression coefficient	Standard error	Wald test	OR (95%CI)	P
Suspected of being infected with SARS-CoV-2?	1.95	0.90	4.64	7.00 (1.19–41.14)	0.031
Relative suspected of being infected with SARS-CoV-2?	3.16	1.56	4.11	23.60 (1.11–501.30)	0.043
Concern towards media coverage of outbreak-related information	2.48	0.69	12.77	11.95 (3.07–46.57)	<0.001
Frequency of recent dreams related to SARS-CoV-2	1.44	0.33	19.29	4.21 (2.22–8.01)	<0.001
Difficulty in controlling your emotions during SARS-CoV-2 epidemic	1.18	0.34	11.80	3.25 (1.66–6.37)	<0.001
Hours spent watching outbreaks per day	0.25	0.06	15.43	1.29 (1.13–1.46)	<0.001

Ethics approval and consent to participate

All procedures performed in studies involving human participants were approved by the ethics committee of West China Hospital, Sichuan University (ref.2020-178) and run in accordance with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. Informed consent was obtained from all individual participants included in the study through the Web-based surveys.

Availability of data and material

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

Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Authors' contributions

S.W., Z.L. and Z.L. developed concept, study design and wrote the original paper. W.X., Y.Y. and Y.L. collected and analyzed the data. Z.X. made critical revision of the manuscript for important intellectual content. All authors read and approved the final manuscript.

Declaration of Competing Interest

None.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.comppsy.2020.152202>.

References

- [1] Holloway HC, Norwood AE, Fullerton CS, Engel JCC, Ursano RJ. The threat of biological weapons. Prophylaxis and mitigation of psychological and social consequences. *JAMA*. 1997;278:425–7.
- [2] Norwood A, Holloway H, Ursano R. Psychological effects of biological warfare. *Mil Med*. 2002;166:27–8.
- [3] Glanz K, Yang H. Communicating about risk of infectious diseases. *JAMA*. 1996;275:253–6.
- [4] World Health Organization, WHO Coronavirus Disease 2019 (Covid-19) Situation Report-158. https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200626-covid-19-sitrep-158.pdf?sfvrsn=1d1aae8a_2; 2020.
- [5] Xiang YT, Yang Y, Li W, Zhang L, Zhang Q, Cheung T, et al. Timely mental health care for the 2019 novel coronavirus outbreak is urgently needed. *Lancet Psychiatr*. 2020;7:228–9.
- [6] Xiaoyu W. Coronavirus outbreak: 444 new cases added on Friday; 2020.
- [7] 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;17:1729.
- [8] Wang C, Pan R, Wan X, Tan Y, Xu L, McIntyre RS, et al. A longitudinal study on the mental health of general population during the Covid-19 epidemic in China. *Brain Behav Immun*. 2020;87:40–8.
- [9] Hao F, Tan W, Jiang L, Zhang L, Zhao X, Zhou Y, et al. Do psychiatric patients experience more psychiatric symptoms during Covid-19 pandemic and lockdown? A case-control study with service and research implications for Immunopsychiatry. *Brain Behav Immun*. 2020;87:100–6.
- [10] Tan BYQ, Chew NWS, Lee GKH, Jing M, Goh Y, Yeo LLL, et al. Psychological impact of the Covid-19 pandemic on health Care Workers in Singapore. *Ann Intern Med*, M20-1038; 2020.
- [11] Chew NWS, Lee GKH, Tan BYQ, Jing M, Goh Y, Ngiam NJH, et al. A multinational, multicentre study on the psychological outcomes and associated physical symptoms amongst healthcare workers during Covid-19 outbreak. *Brain Behav Immun*. 2020; S0889-S1591:30523–7.
- [12] Prevention CFDC. Notice on the issuance of principles for emergency psychological crisis intervention for the new coronavirus pneumonia (in Chinese); 2020.
- [13] Liu CY, Yang YZ, Zhang XM, Xu X, Dou QL, Zhang WW, et al. The prevalence and influencing factors in anxiety in medical workers fighting Covid-19 in China: a cross-sectional survey. *Epidemiol Infect*. 2020;148:e98.
- [14] 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.
- [15] Al-Rabiah A, Temsah M, Al-Eyadhy AA, Hasan GM, Al-Zamil F, Al-Subaie S, et al. Middle East respiratory syndrome-Corona virus (MERS-CoV) associated stress among medical students at a university teaching hospital in Saudi Arabia. *J Infect Public Heal*. 2020;13:687–91.
- [16] Wong J, Cheung E, Cheung V, Cheung C, Chan M, Chua S, et al. Psychological responses to the SARS outbreak in healthcare students in Hong Kong. *Med Teach*. 2004;26:657–9.
- [17] Loh L, Ali AM, Ang T, Chelliah A. Impact of a spreading epidemic on medical students. *Malays J Med Sci*. 2006;13:30–6.
- [18] Khalid I, Khalid TJ, Qabajah MR, Barnard AG, Qushmaq IA. Healthcare workers emotions, perceived stressors and coping strategies during a MERS-CoV outbreak. *Clin Med Res*. 2016;14:7–14.
- [19] Wang JL. *Clinical epidemiology - clinical research design, measurement and evaluation*. Shanghai: The Science and Technology Press in Shanghai; 2001.
- [20] Kessler RC, Andrews G, Colpe LJ, Hiripi E, Mroczek DK, Normand SL, et al. Short screening scales to monitor population prevalences and trends in non-specific psychological distress. *Psychol Med*. 2002;32:959–76.
- [21] Kessler RC, Green JG, Gruber MJ, Sampson NA, Bromet E, Cuitan M, et al. Screening for serious mental illness in the general population with the K6 screening scale: results from the WHO World Mental Health (WMH) survey initiative. *Int J Methods Psychiatr Res*. 2010;19(Suppl. 1):4–22.
- [22] Wittchen H. Screening for serious mental illness: methodological studies of the K6 screening scale. *Int J Methods Psychiatr Res*. 2010;19(Suppl. 1):1–3.
- [23] Kessler RC, Barker PR, Colpe LJ, Epstein JF, Gfoerer JC, Hiripi E, et al. Screening for serious mental illness in the general population. *Arch Gen Psychiatry*. 2003;60:184–9.
- [24] Kang Y, Guo W, Xu H, Chen Y, Li X, Tan Z, et al. The 6-item Kessler psychological distress scale to survey serious mental illness among Chinese undergraduates: psychometric properties and prevalence estimate. *Compr Psychiatry*. 2015;63:105–12.
- [25] Zhou C, Chu J, Wang T, Peng Q, He J, Zheng W, et al. Evaluation of reliability and validity of the Chinese version of simple psychological assessment scale Kessler10 (in Chinese). *Chin J Clin Psych*. 2008;16:627–9.
- [26] Tan W, Hao F, McIntyre RS, Jiang L, Jiang X, Zhang L, et al. Is returning to work during the Covid-19 pandemic stressful? A study on immediate mental health status and Psychoneuroimmunity Prevention measures of Chinese workforce. *Brain Behav Immun*. 2020;87:84–92.
- [27] Ho CS, Chee CY, Ho RC. Mental health strategies to combat the psychological impact of Covid-19 beyond paranoia and panic. *Ann Acad Med Singapore*. 2020;49:155–60.
- [28] Chan AO, Huak CY. Psychological impact of the 2003 severe acute respiratory syndrome outbreak on health Care Workers in a Medium Size Regional General Hospital in Singapore. *Occup Med (Lond)*. 2004;54:190–6.

- [29] Chua SE, Cheung V, Cheung C, McAlonan GM, Wong JWS, Cheung EPT, et al. Psychological effects of the SARS outbreak in Hong Kong on high-risk health care workers. *Can J Psychiatry*. 2004;49:391–3.
- [30] Graner KM, Cerqueira AT. Integrative review: psychological distress among university students and correlated factors. *Cien Saude Colet*. 2019;24:1327–46.
- [31] Ministry of Education of the People's Republic of China. Notice of the Ministry of Education On the Postponement of the Spring Semester in 2020 (in Chinese). http://www.moe.gov.cn/jyb_xwfb/gzdt_gzdt/s5987/202001/t20200127_416672.html; 2020.
- [32] Khasawneh A, Humeidan AA, Alsulaiman JW, Bloukh S, Ramadan M, Al-Shatanawi TN, et al. Medical students and Covid-19: knowledge, attitudes, and precautionary measures. A descriptive study from Jordan. *Front Public Health*. 2020;8:253.
- [33] Patil N, Chan Y, Yan H. SARS and its effect on medical education in Hong Kong. *Med Educ*. 2003;37:1127–8.
- [34] Tran BX, Dang AK, Thai PK, Le HT, Le XTT, Do TTT, et al. Coverage of health information by different sources in communities: implication for Covid-19 epidemic response. *Int J Environ Res Public Health*. 2020;17:3577.
- [35] Sim K, Chan YH, Chong PN, Chua HC, Soon SW. Psychosocial and coping responses within the community health care setting towards a National Outbreak of an infectious disease. *J Psychosom Res*. 2010;68:195–202.
- [36] Maunder RG, Lancee WJ, Balderson KE, Bennett JP, Borgundvaag B, Evans S, et al. Long-term psychological and occupational effects of providing hospital healthcare during SARS outbreak. *Emerg Infect Dis*. 2006;12:1924–32.
- [37] Carlson LE. Mindfulness-based interventions for physical conditions: a narrative review evaluating levels of evidence. *ISRN Psychiatry*. 2012;2012:651583.
- [38] 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;170:793–8.
- [39] Chong M, Wang W, Hsieh W, Lee C, Chiu N, Yeh W, et al. Psychological impact of severe acute respiratory syndrome on health workers in a tertiary hospital. *Br J Psychiatry*. 2004;185:127–33.
- [40] Mobaraki K, Ahmadzadeh J. Current epidemiological status of Middle East respiratory syndrome coronavirus in the world from 1.1.2017 to 17.1.2018: a cross-sectional study. *BMC Infect Dis*. 2019;19:351.
- [41] Young ME, Norman GR, Humphreys KR. Medicine in the popular press: the influence of the media on perceptions of disease. *PLoS One*. 2008;3:e3552.
- [42] Lee SM, Kang WS, Cho A, Kim T, Park JK. Psychological impact of the 2015 MERS outbreak on hospital workers and quarantined hemodialysis patients. *Compr Psychiatry*. 2018;87:123–7.