

# Psychological Distress Was Still Serious Among Anesthesiologists Under the Post COVID-19 Era

Fei Guo<sup>1\*</sup>, Ruili Han<sup>1\*</sup>, Ting Luo<sup>2\*</sup>, Shengyang Jin<sup>3</sup>, Yuting Yan<sup>1</sup>, Jun Wang<sup>4</sup>, Xude Sun<sup>1</sup>, Changjun Gao<sup>1</sup>

<sup>1</sup>Department of Anesthesiology, The Second Affiliated Hospital of Air Force Medical University, Xi'an, People's Republic of China; <sup>2</sup>Department of Obstetrics and Gynecology, The Second Xiangya Hospital of Central South University, Changsha, People's Republic of China; <sup>3</sup>Plastic Surgery Hospital, Chinese Academy of Medical Sciences and Peking Union Medical College, Beijing, People's Republic of China; <sup>4</sup>Department of Anesthesiology, Shaanxi Provincial Armed Police Hospital, Xi'an, People's Republic of China

\*These authors contributed equally to this work

Correspondence: Changjun Gao; Xude Sun, Department of Anesthesiology, The Second Affiliated Hospital of Air Force Medical University, Xi'an, 710038, People's Republic of China, Tel +86-13379227869; +86-13891905550, Fax +86-029-84777439, Email gaocj74@163.com; sunxude@fmmu.edu.cn

**Purpose:** This study aims to evaluate the psychological status and the attitudes toward the novel coronavirus disease 2019 (COVID-19) vaccine among anesthesiologists. We expected to analyze related factors and offer them some strategies to prevent and manage psychological issues under the post COVID-19 era.

**Methods:** Based on the Checklist for Reporting Results of Internet E-Surveys (CHERRIES), an online survey was designed and conducted among anesthesiologists in Shaanxi, China. Participants were asked to complete a validated questionnaire voluntarily. The following tests were performed: Depression, Anxiety and Stress Scale (DASS-21), Primary Care Post-traumatic Stress Disorder Screen (PC-PTSD), and the attitudes toward COVID-19 vaccine.

**Results:** A total of 795 anesthesiologists completed the survey, the majority of them were female, young and middle-aged, well educated, and married. The prevalence of depression, anxiety, and stress in this sample were 26.5%, 35.5%, and 19.9%, respectively. Longer daily working time, concomitant basic chronic disease, and COVID-19 exposure were extracted as risk factors for the psychological symptoms, while vaccination, elder age, and married status were negatively associated with them. An unsatisfied vaccination rate (71.9%) which might be linked with inadequate awareness and perception of the COVID-19 vaccine was also detected in this study.

**Conclusion:** Anesthesiologists are still under rising pressure of psychological symptoms in the post COVID-19 era. It is imperative to afford continuous psychological support to them and ensure their mental health and professional performance.

**Keywords:** COVID-19, anesthesiologist, depression, anxiety, stress

## Introduction

Anesthesiology is a specialty whose specificity of the working process results in high levels of stress as an inevitable condition which is a particularly worrying situation in daily life.<sup>1</sup> Due to a range of interconnected factors such as burnout,<sup>2</sup> irregular working hours, and high occupational stress,<sup>3</sup> the mental state of the anesthesiologist is often reported at a poor level as compared to other professional groups.<sup>4</sup>

The overall impact of COVID-19 has imposed unprecedented changes on the economic, medical, and public health infrastructure of China and to some extent, of other countries.<sup>5</sup> Anesthesiologists were exposed to significant biological and psychosocial risks during the COVID-19 pandemic.<sup>6</sup> According to the data obtained in the COVID-19 outbreak, it revealed that the epidemic might have burdened with a long-term psychological affection on the health care professionals working in operating theaters, or even produced post-traumatic stress disorder (PTSD).<sup>7</sup> Meanwhile, it was also detected that the knowledge about COVID-19 and the experiences on self-protection among anesthesiology specialists and residents were still insufficient, which could cause distress when they meet the suspected/confirmed COVID-19 case.<sup>8</sup> In addition, as the local clustered epidemic caused by delta strains is being reported frequently, China is under rising

pressure of guarding against imported COVID-19 cases. It is necessary to focus on the infection worries and psychological distress among anesthesiologists.

As a former report calling on, the COVID-19 outbreak should be regarded as a new red flag, reminding all anesthesia providers to be prepared and pay attention to self-protection.<sup>9</sup> Therefore, this study aims to evaluate the psychological status and the attitudes toward the COVID-19 vaccine among anesthesiologists under the post COVID-19 era. We expected to analyze the related factors and offer some strategies to prevent and manage the psychological issues.

## Methods

### Study Design and Participants

The online survey was designed and reported based on the Checklist for Reporting Results of Internet E-Surveys (CHERRIES),<sup>10</sup> see the Checklist ([Supplementary Material 1](#)). A cross-sectional study was performed from March 1 to 31, 2021. Participants were voluntary anesthesiologists from hospitals in Shaanxi province, China. Written informed consent was obtained by all participants before completing a self-administered questionnaire ([Supplementary Material 2](#)) on an online platform (<https://www.wjx.cn>). The questionnaire included 3 parts and consisted of sociodemographic information, psychological tests on depression, anxiety, stress, and PTSD, and the attitudes toward the COVID-19 vaccine. According to the branching logic that whether questions were applied to the relative individual participants, the number of the survey questions varied respectively. All valid information was collected from the completed questionnaires anonymously.

This study was approved by the Research Ethics Committee of Plastic Surgery Hospital of Chinese Academy of Medical Science (2021/21), moreover, it was registered at the Chinese Clinical Trial Registry (Registration number: ChiCTR2100043832).

### Outcome Measures

#### Demographic Information

This part collected the participants' gender, age, marital status, educational background, academic rank, monthly income, daily working time (hours), presence of basic chronic diseases, the experience of exposure to COVID-19, and uptake data of the COVID-19 vaccine.

#### Psychological Tests

The Chinese brief version of the Depression, Anxiety, and Stress Scale (DASS-21) was used to assess psychological disorders in this study. The DASS-21<sup>11</sup> is a 21-item system that provides independent measures of depression (statement numbered 3, 5, 10, 13, 16, 17, 21; the Cronbach's  $\alpha$  of these items was 0.86 in this study), anxiety (statement numbered 2, 4, 7, 9, 15, 19, 20; the Cronbach's  $\alpha$  of these items was 0.81 in this study), and stress (statement numbered 1, 6, 8, 11, 12, 14, 18; the Cronbach's  $\alpha$  of these items was 0.88 in this study) with recommended severity thresholds. The Cronbach's  $\alpha$  of the whole DASS-21 was 0.94 in this study. The DASS-21 items are scored on a 4-point scale ranging from 0 (did not apply to me at all) to 3 (applied to me very much, or most of the time). The sum scores of each item used to indicate the frequency of symptomatology would determine how mild or serious each condition may be. The cutoff scores present different severity for depression (normal 0–9, mild 10–13, moderate 14–20, severe  $\geq 21$ ), anxiety (normal 0–7, mild 8–9, moderate 10–14, severe  $\geq 15$ ), and stress (normal 0–14, mild 15–18, moderate 19–25, severe  $\geq 26$ ), respectively.

The validated Chinese version of Primary Care PTSD Screen (PC-PTSD) was considered as a useful instrument for the initial screen in primary care.<sup>12</sup> In this study, to screen the PTSD likely symptoms which might be caused by the COVID-19, a transitional question was placed in the questionnaire as follow: "Up to now, have you ever experienced any events that were so frightening, horrible, or upsetting related with the outbreak of COVID-19?". Those who stated encountering events were asked to accomplish the 4-items of the PC-PTSD. The score of each question was defined as 0 (never) or 1 (yes). The total score of the PC-PTSD was 0 to 4, with a cutoff  $\geq 2$  that was taken as diagnostic criteria which had a high sensitivity of 0.78 and a specificity of 0.87 in the original validation study. The Cronbach's  $\alpha$  of the 5 items was 0.70 in this study.

## The Attitudes Toward the COVID-19 Vaccine

The awareness of the COVID-19 vaccine among anesthesiologists was evaluated by six questions: “1. Do you think the infectious risk of COVID-19 can be reduced by vaccination? 2. Do you think there is a big difference in the effectiveness of COVID-19 vaccines produced by different manufacturers? 3. Do you think you will never infect COVID-19 after getting vaccination? 4. Do you think the COVID-19 vaccine has side effects? 5. Do you worry about the COVID-19 vaccine having side effects? 6. Do you think the medical staff should be a priority to get the COVID-19 vaccine?” The answers to these questions are yes, no, and uncertain.

## Quality Control

Quality control of this survey was realized by two steps: First, the general knowledge as “which day is Chinese national day?” was embedded in the questionnaire to extract carelessly respondents. Second, all collected questionnaires with a response time less than 150 seconds that was examined by the researchers would be excluded as invalid.

## Statistical Analysis

Descriptive analyses were used to calculate demographic information and the main outcomes of the respondents. All these basic statistics were computed and reported as several cases (frequency) and percentages for categorical variables. Multiple logistical regression was performed to extract potential factors and explore the correlation between these variables and the psychological symptoms. Data were analyzed by the Statistical Package for Social Science version 25.0 (SPSS 25.0). All significance tests were two-tailed and  $p < 0.05$  is accepted for statistical significance.

## Results

### Sociodemographic Characteristics of Participants

The baseline details of this sample are presented in [Table 1](#). 63.4% of the participants were female, and more than half of them were aged from 30 to 39 years. 72.0% of them were married with children. Approximately 87% of the participants' educational backgrounds were bachelors or higher degrees. The majority (56%) academic ranks of this sample were middle to the high title. 63.6% of participants needed to work more than 8 hours every day, however, only 9.8% of them got a monthly income of more than 10,000 Chinese Yuan (CNY). In addition, 12.2% of the respondents lived with basic chronic diseases such as hypertension, diabetes, cardiovascular and cerebrovascular diseases, and so on. Since the COVID-19 outbreak, 73 anesthesiologists fighting on the front line had experienced direct exposure to COVID-19. Up to the deadline of this survey, the vaccination rate only reached 71.9%.

### Prevalence of Psychological Symptoms

According to the diagnostic criteria of DASS-21, the psychological symptoms among anesthesiologists were revealed in [Figure 1](#). The prevalence of depression, anxiety, and stress in this sample were 26.5% (mild 12.1%, moderate 11.3% and severe 3.1%), 35.5% (mild 10.2%, moderate 17.7% and severe 7.6%) and 19.9% (mild 10.2%, moderate 7.0% and severe 2.7%), respectively.

To further investigate the psychological impact of the COVID-19 pandemic, we performed a PC-PTSD screen in this study. 427 (53.7%) respondents stated they had suffered COVID-19 related events which left a long-term frightening, horrible, and upsetting experience on them. The composition of anesthesiologists with different sum scores was shown in [Figure 2](#). According to the diagnostic criteria (sum scores  $\geq 2$ ), 20.8% of them have highly suspected with PTSD likely symptoms.

### Anesthesiologists' Attitudes Toward COVID-19 Vaccine

The awareness of the COVID-19 vaccine among anesthesiologists was collected in [Table 2](#). 85.7% of them thought the infectious risk of COVID-19 could be reduced by vaccination, and 87.0% held that medical staff should be a priority for the COVID-19 vaccine. However, 7.0% of respondents firmly believed that they would never be infected after getting the COVID-19 vaccination, and 40.4% were uncertain about the effectiveness of COVID-19 vaccines produced by different manufacturers. On the other side, 33.1% of respondents thought that the COVID-19 vaccines have side effects and 53.3% felt worried about that.

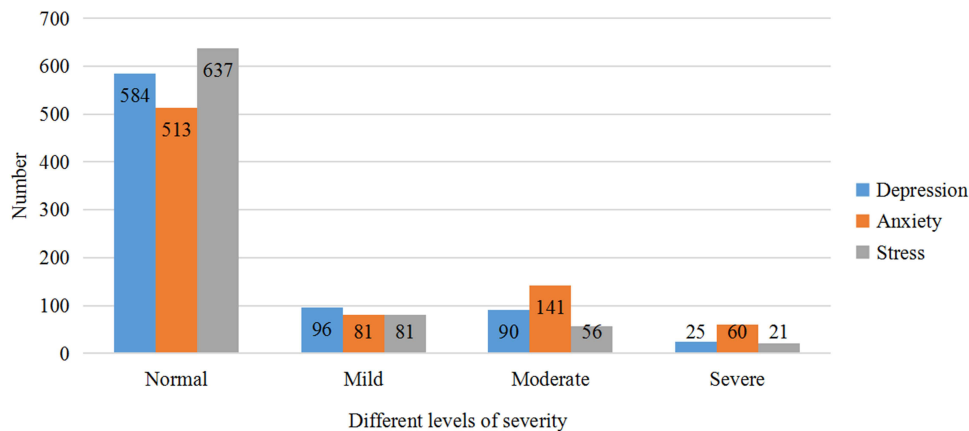
**Table 1** Sociodemographic Characteristics of Anesthesiologists in This Study (n=795)

Sociodemographic Characteristics		n(%)
Gender	Male	291 (36.6%)
	Female	504 (63.4%)
Age	20–29	186 (23.4%)
	30–39	422 (53.1%)
	40–49	137 (17.2%)
	≥ 50	50 (6.3%)
Marital status	Single	105 (13.2%)
	In love	44 (5.5%)
	Married without children	74 (9.3%)
	Married with children	572 (72.0%)
Educational background	College	102 (12.8%)
	Bachelor	589 (74.1%)
	Graduate	93 (11.7%)
	Doctor	11 (1.4%)
Academic rank	Primary title	350 (44.0%)
	Middle title	318 (40.0%)
	High title	127 (16.0%)
Monthly income(CNY)	< 5000	363 (45.7%)
	5000–10,000	354 (44.5%)
	> 10,000	78 (9.8%)
Daily working time (hours)	≤ 8	289 (36.4%)
	> 8	506 (63.6%)
Basic chronic disease	Yes	97 (12.2%)
	No	698 (87.8%)
Exposure to COVID-19	Yes	73 (9.2%)
	No	722 (90.8%)
Vaccination	Yes	572 (71.9%)
	No	223 (28.1%)

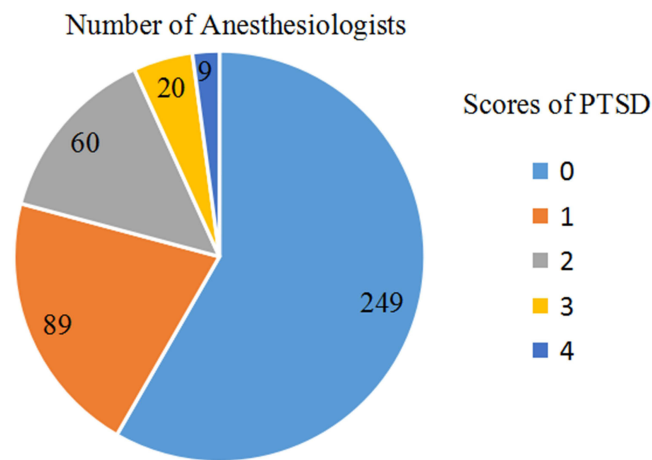
**Abbreviations:** CNY, Chinese Yuan; COVID-19, coronavirus disease 2019.

### Logistic Regression Analysis of the Potential Factors in Psychological Symptoms

To explore the influence of sociodemographic characteristics on psychological symptoms among anesthesiologists, a multivariate logistical regression was performed to extract the potential factors (Summarized in Table 3). The results indicated that vaccination was negatively associated with the presence of depression (OR = 0.582, 95% CI = 0.412–0.822), anxiety (OR = 0.514, 95% CI = 0.371–0.712) and stress (OR = 0.559, 95% CI = 0.380–0.822) in this sample, elder age



**Figure 1** Psychological symptoms among anesthesiologists.



**Figure 2** The composition of anesthesiologists with different PTSD sum scores.

(OR = 0.744, 95% CI = 0.608–0.909) and married status (OR = 0.837, 95% CI = 0.708–0.990) were protective factor for anxiety and stress respectively. On the contrary, the logistic regression analysis showed that daily working time > 8 hours (OR = 1.572, 95% CI = 1.104–2.237), basic chronic disease (OR = 2.218, 95% CI = 1.416–3.474) and exposure to COVID-19 (OR = 1.804, 95% CI = 1.073–3.033) were risk factors for depression. Meanwhile, basic chronic disease (OR = 2.557, 95% CI = 1.604–4.076) and exposure to COVID-19 (OR = 2.165, 95% CI = 1.312–3.571) were risk factors for anxiety. Finally, those who had daily working time more than 8 hours (OR = 1.985, 95% CI = 1.305–3.020), basic chronic disease (OR = 3.823, 95% CI = 2.374–6.154) and exposure to COVID-19 (OR = 2.620, 95% CI = 1.516–4.528) were more likely to suffer stress.

## Discussion

The pandemic of COVID-19 has registered 278,714,484 confirmed cases in the world and 5,393,950 deaths globally were declared by the World Health Organization (WHO) on 28th December 2021. The situation of the COVID-19 pandemic is still unpredictable and the battle against the epidemic has arrived at a crucial moment around the world.<sup>13</sup> This unique cross-sectional study assessed the psychological status of anesthesiologists in 2021 which was called the post COVID-19 era. More than half of the registered members from the Shaanxi Association of Anesthesiologists took part in this survey, and a representative sample was collected.

This study revealed that the wider psychological impact of the COVID-19 epidemic on the anesthesiology profession had not been eliminated. The prevalence of depression, anxiety, and stress in this sample were still high at 26.5%, 35.5%, and 19.9%, respectively. Compared with the data reported during the COVID-19 outbreak,<sup>14</sup> we did not find any significant reduction. It also should be noted that the positive rate of PTSD related to COVID-19 experience was

**Table 2** Anesthesiologists' Attitudes Toward the COVID-19 Vaccine

Items	Yes	No	Uncertain
	n(%)	n(%)	n(%)
1. Do you think the infectious risk of COVID-19 can be reduced by vaccination?	681(85.7%)	14(1.8%)	100(12.5%)
2. Do you think there is a big difference in the effectiveness of COVID-19 vaccines produced by different manufacturers?	284(35.7%)	190(23.9%)	321(40.4%)
3. Do you think you will never infect COVID-19 after getting vaccination?	55(7.0%)	507(63.7%)	233(29.3%)
4. Do you think the COVID-19 vaccine has side effects?	263(33.1%)	154(19.4%)	378(47.5%)
5. Do you worry about the COVID-19 vaccine having side effects?	424(53.3%)	201(25.3%)	170(21.4%)
6. Do you think the medical staff should be a priority for getting the COVID-19 vaccine?	692(87.0%)	48(6.0%)	55(7.0%)

**Abbreviation:** COVID-19, coronavirus disease 2019.

**Table 3** The Logistic Regression Analysis of the Potential Factors in Psychological Symptoms

Psychological Symptoms	Potential Factors	B	S.E.	P	OR	95%C.I. for OR	
						Lower	Upper
Depression	Daily working time (> 8 hours)	0.452	0.180	0.012	1.572	1.104	2.237
	Basic chronic disease	0.797	0.229	0.001	2.218	1.416	3.474
	Exposure to COVID-19	0.590	0.265	0.026	1.804	1.073	3.033
Anxiety	Vaccination	-0.541	0.176	0.002	0.582	0.412	0.822
	Elder age	-0.296	0.103	0.004	0.744	0.608	0.909
	Basic chronic disease	0.939	0.238	0.000	2.557	1.604	4.076
Stress	Exposure to COVID-19	0.772	0.255	0.002	2.165	1.312	3.571
	Vaccination	-0.666	0.166	0.000	0.514	0.371	0.712
	Married status	-0.178	0.086	0.038	0.837	0.708	0.990
	Daily working time (> 8 hours)	0.686	0.214	0.001	1.985	1.305	3.020
	Basic chronic disease	1.341	0.243	0.000	3.823	2.374	6.154
	Exposure to COVID-19	0.963	0.279	0.001	2.620	1.516	4.528
	Vaccination	-0.582	0.197	0.003	0.559	0.380	0.822

**Abbreviations:** COVID-19, coronavirus disease 2019; CI, confidence interval; OR, odds ratio; S.E., standard error.

20.8% in this study. We concluded that psychological distress was still serious among the anesthesiologists. Therefore, psychological supports were urged to reverse the trend in light of these results. In this sample, longer daily working time, basic chronic disease, and exposure to COVID-19 were extracted as risk factors linked with the increased probability of psychological symptoms. As former researchers indicated longer daily working time was the main reason for burnout with high stress among the anesthesiologists.<sup>15,16</sup> Offering the clinician the option to rank preferred sites or schedules and allowing flexibility of work hours might help mitigate the challenge.<sup>17</sup> In addition, several studies also highlighted the importance of taking more humanistic care and support on anesthesiologists concomitant basic chronic disease.<sup>18–20</sup> Importantly, anesthesiologists who were exposed to the COVID-19 on the front line demonstrated their professionalism, responsibility, and humanitarianism in fighting against the pandemic. According to the experience, long-term individualized counseling programs should be performed to alleviate their psychological symptoms.<sup>21</sup>

Furthermore, this study detected an unsatisfied vaccination rate (71.9%) and insufficient awareness of the COVID-19 vaccine among the anesthesiologists. Considering these conflicts might be detrimental to the nationwide vaccination program, we strongly suggest that the public agencies should report the safety and efficacy of the COVID-19 vaccine timely.<sup>22</sup> Meanwhile, it was evident that vaccination, elder age, and married status were negatively associated with the presence of depression, anxiety, and stress in this study. Consistent with previous studies, we speculated that the poor mental health and knowledge of the COVID-19 vaccine might substantially impact the vaccination decisions of anesthesiologists,<sup>23</sup> and we again affirmed that more experienced anesthesiologists get the ability to better handle potentially stressful situations and work overload.<sup>24,25</sup> Therefore, social support among colleagues and sharing work with experienced professionals might be practical strategies to manage these issues.<sup>26</sup>

Several limitations merit consideration in this study. Even though more than half of the anesthesiologists in Shaanxi province participated in this study, the sampling bias may still exist. Second, due to this study being a cross-sectional survey, the causality between demographic variables and the psychological symptoms in this study cannot be acquired. Finally, we cannot compare the current condition with the absence of data on the psychological symptoms among the anesthesiologists during the COVID-19 outbreak. Furthermore, this survey was conducted at the first wave of the nationwide vaccination program implemented in China, the vaccination rate might be affected by the contradiction between supply and demand of COVID-19 vaccines at that time.

## Conclusion

A high rate of psychological symptoms with rising pressure still existed among anesthesiologists under the post COVID-19 era. The public and community should attach great importance to those who have long daily working time,

concomitant basic chronic disease, and exposure to COVID-19. It is imperative to afford continuous psychological support to the anesthesiologists and ensure their mental health and professional performance.

## Data Sharing Statement

The data supporting the findings are available from the corresponding author Changjun Gao on reasonable request.

## Ethics Statement

This study was approved by the Research Ethics Committee of Plastic Surgery Hospital of Chinese Academy of Medical Science (2021/21), moreover, it was registered at the Chinese Clinical Trial Registry (Registration number: ChiCTR2100043832). Informed consent was obtained from all participants before completing the online questionnaire. All procedures used complied with the ethical principles on human experimentation and with the Helsinki Declaration of 1975 as revised in 2008.

## Acknowledgments

The authors wish to acknowledge the participation of all anesthesiologists in this study.

## Disclosure

The authors declare that they have no competing interests in this work.

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