

# Should Medical Students Be Overprotected? A Survey from China and Review About the Roles of Medical Student Under the COVID-19

Fenghua Qian<sup>1</sup>, Shanshan Zhang<sup>2</sup>, Deepali M Patel<sup>2</sup>, Yifang Li<sup>2</sup>, Jian Jiao<sup>2</sup>

<sup>1</sup>Department of Education and Training, China-Japan Union Hospital, Jilin University, Changchun, People's Republic of China; <sup>2</sup>Department of Gastroenterology & Hepatology, China-Japan Union Hospital, Jilin University, Changchun, People's Republic of China

Correspondence: Jian Jiao, Department of Gastroenterology & Hepatology, China-Japan Union Hospital, Jilin University, Changchun, People's Republic of China, Tel +86 13756009567, Email jjiao@jlu.edu.cn

**Objective:** The impact of COVID-19 continues to this day, there are many disputes about how medical students should be managed and diverse arrangements were adopted by medical schools around all over the world. The purpose of this study was to discuss the risks and benefits of medical student participation in healthcare in the context of COVID-19.

**Methods:** An online cross-sectional survey was distributed to 300 Medical students undergoing standardized training program (STP) in China-Japan Union Hospital of Jilin University. The survey included questions about basic demographic characteristics, roles and mental state of interns during the pandemic, comments on the University's management of medical students. Data were processed using SPSS 25.0 statistical analysis software, the comparison between two groups of data was performed using *t*-test; the non-normally distributed variables were analyzed using Mann-Whitney *U*-test, differences between groups were compared using chi-square test for analysis.  $p < 0.05$  was considered statistically significant.

**Results:** A total of 191 students completed the survey (response rate 63.67%). The epidemic had a significant psychological impact on students, but most of them believed that participation in clinical work under voluntary, precise protective measures and strict supervision were benefit for their future. Older, married, female, and salaried students are more willing to engage in pandemic-related activities. The biggest challenge of working under the pandemic focused on high working pressure and insufficient protection, the biggest harvest was getting knowledge and accumulating experience.

**Conclusion:** Circumstances, cultures, outbreaks and strategies for coping with COVID-19 varied around the world. Medical students do not need to be overprotected, participation in pandemic work in an optimized system is acceptable and beneficial to their career plan. Medical education should focus on improving the social status of infectious diseases and cultivating future doctors with awareness of epidemic prevention and control.

**Keywords:** medical student, response, psychological, the novel coronavirus disease (COVID-19)

## Introduction

More than three years have passed since the global outbreak of COVID-19, which has made a lot of changes in our daily lives. Various preventive and therapeutic measures have been taken in countries around the world, but with the mutant viruses appear constantly, the new coronavirus will coexist with us and affect our work and life for a long time.

In the context of the epidemic, work stoppage and school suspension have become a common phenomenon, many colleges have switched from offline to online teaching. While unlike other students, there are many disputes about how medical students should be managed. Doctors may be the most busy and tired people during the epidemic, at the peak of the COVID, many hospitals are overcrowded and the number of doctors is highlighted as insufficient. Medical students, especially those graduate students accepting standardized clinical training as interns, if managed as students, they should be suspended from school, while being a special group distinct from non-medical students, they are on the verge of becoming real doctors even though they are not legally licensed yet, maybe it is a good opportunity for them to learn and

exercise, also, they have the social responsibility to participate in the anti-epidemic activities, the debate as to whether to reintegrate medical students into a strained learning environment rages on a wide scale.

In the early days of the COVID-19 pandemic, almost all face-to-face learning opportunities, including internships, clinical rotations and even group sessions were suspended, these educational pathways and modalities were uncertain and difficult to achieve in the future. Of course, educational administrators offered online learning and web conferencing platforms to organize student learning in order not to delay the learning process while bringing the community closer together. A notable consequence of the pandemic has been the elimination of clinical rotations for many medical students, which has limited opportunities for hands-on learning, especially for the development of clinical thinking and communication skills for medical students. However, in countries such as Ireland, Italy and the United Kingdom, where clinical positions were vacant in the face of the pandemic, the early involvement of their students in clinical work and the assurance that participation was voluntary with adequate personal protection and health care coverage, allowed for safe integration into the clinical setting and even for later work.

On the other hand, medical students who are not involved in clinical work may experience anxiety, guilt and other negative emotions. Therefore, it is also important to pay attention to students' mental health while providing educational resources and learning platforms.

China was the first country reported the COVID-19 in the world and experienced strict control measures including school closings and city lockdowns, the education systems for medical students, like those around the world, have been tested.<sup>1</sup> There are two types of interns in China's medical education system: the one is prospective physician accepting standardized clinical training after graduation, they get paid monthly, and the other one is clinical postgraduate training for a master's degree without salary, the training process of these two groups are parallel. During the outbreak, on-line teaching was adopted for postgraduate for half a year and those prospective physicians kept rotating in clinical departments (they have the right to make a choice about the rotation). In order to provide suggestions for the management of medical student, we conducted a cross-sectional study using an online-questionnaire in June 2021.

## Methods

### Study Design

This cross-sectional survey study was designed to obtain information from medical residents accepting standardized clinical training in China-Japan Union Hospital of Jilin University. We followed the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) reporting guidelines and the Consensus-Based Checklist for Reporting of Survey Studies (CROSS) guidelines. The survey was conducted from 15 June 2021 to 31 June 2021.

### Data Collection Process

A Chinese questionnaire online survey was conducted using Questionnaire Star software to investigate the impact of COVID-19 pandemic on status and psychological responses of standardized training interns in China-Japan Union Hospital of Jilin University.

We set up a reminder to check the integrity of questionnaire to make sure that each questionnaire is completely filled and there are no missing items. Survey participation was voluntary and anonymous, and the participants were asked to give verbal informed consent at the beginning. No economical compensation was offered to participants. A logical check was performed and outliers were eliminated before data analysis.

### Structured Questionnaires and Quality Control

The survey was composed by 32 questions, divided into 3 sections:

1. Demographic characteristics and status of students during COVID-19 pandemic.
2. Cognition and psychological responses of students involving the epidemic (hospital/community).
3. Harvest and motivation of students participating the COVID-19 related activities.

The reliability and validity of questionnaire were verified.

## Data Analysis

Data were analysed using SPSS 25.0 statistical analysis software, with the measurement data conforming to normal or approximately normal distribution expressed as mean  $\pm$  standard deviation ( $\bar{X} \pm S$ ), and the comparison between two groups of data was performed using the *t*-test; the non-normally distributed variables were analyzed using the Mann–Whitney *U*-test for comparison of differences between two groups; the count data were statistically described using the frequency Statistical description was performed, and differences between groups were compared using chi-square test for analysis.  $p < 0.05$  was considered statistically significant.

## Ethical Considerations

This study was conducted in accordance with the Declaration of Helsinki and approved by the Institutional Education Review Board of China-Japan Union Hospital of Jilin University (code of ethics: CJUH20202126). Informed consent was obtained from all participants. The participants' informed consent included publication of anonymized responses and the rights to withdraw from participation at any time during the study. All the information regarding this study, including the researchers' contact information, was duly provided. Anonymity was guaranteed throughout the research process associated with this study. The well-being of the participants involved in this study was monitored throughout the questionnaires.

## Results

### Demographic Characteristics and Status of 191 Standardized Training Interns During COVID-19 Pandemic

A total of 191 standardized training interns, which included 121 prospective physician (63.35%) and 70 clinical postgraduate (36.65%) responded to the survey.

Compared with the clinical postgraduate group, the students in the prospective physician group showed the characteristics of being older, more female, more married, and more of them came from other provinces other than Jilin Province, their involving the epidemic was also higher than that of the clinical postgraduate group. The survey revealed that only 1 graduate student had direct contact with a COVID-19 patient during the pandemic, and it was an accidental encounter in clinical work, as interns in the hospital were arranged in low-risk clinical areas, no student were infected with COVID-19 during this period. Details are shown in [Table 1](#).

### Cognition and Psychological Responses of 25 Standardized Training Interns Involving the Epidemic

Psychological responses were divided into 5 levels in this study, most of the students involved in the epidemic showed mild to moderate degree of worry, anxiety and security. In general, clinical graduate group was less worried and anxious than prospective physician, however, a certain proportion of students, especially the clinical postgraduates, who expressed not know much about the protection policy, details are shown in [Table 2](#).

### Harvest and Motivation Analysis on 191 Medical Interns During the Outbreak

About 40–60% interns involved clinical work during the epidemic agreed that the work arrangement during the epidemic was reasonable, while some students kept individual opinion. Most of the students volunteered to participate in clinical work during the pandemic, but some of them may acted as a result of peer pressure although our policy is to follow individual wishes. The biggest challenge focused on high working pressure and insufficient protection, and the biggest harvest was getting knowledge and accumulating experience. The reasons for hesitation in entering clinical work of the 191 students varied. More than 50% of the students chose “obligation as a medical student (sense of social responsibility)”, “shortage of medical personnel”, “I develop my professional job profile” and “I will take pride in contributing”, a small proportion of the motivation was due to pressure from managers or financial compensation related to COVID-19. Details were shown in [Table 3](#).

**Table 1** Demographic Characteristics and Status of 191 Standardized Training Interns During COVID-19 Pandemic

Characteristics	Prospective Physician (n=121)	Clinical Postgraduate (n=70)	p
Age, mean (years)	27.86±2.42	25.87±1.26	P<0.001*
Gender (%)			
Female	87 (71.9%)	29 (41.4%)	P<0.001*
Male	34 (28.1%)	41 (58.6%)	
Marital status			
Married	33 (27.3%)	2 (2.9%)	P<0.001*
Not married	88 (72.7%)	68 (97.1%)	
Place of residence			
Jilin Province	114 (94.2%)	26 (37.1%)	P<0.001*
Other Province	7 (5.8%)	44 (62.9%)	
Involving the epidemic (hospital/community)			
Yes	22 (18.2%)	5 (7.1%)	P<0.001*
No	99 (81.8%)	65 (92.9%)	
Working content (departments)			
Surgery	3 (13.6%)	1 (20%)	P<0.001*
Internal	2 (9.1%)	1 (20%)	
Others	17 (77.3%)	3 (60%)	
Working hours (daily time span)			
All day	22 (100%)	5 (100%)	P<0.001*
Not all day	0 (0)	0 (0)	
Exposed to COVID-19 patients during the epidemic			
Yes	0 (0)	1 (20%)	P<0.001*
No	22 (100%)	4 (80%)	

Note: \*P<0.05.

## Discussion

Whether to reintegrate medical students into a strained learning environment rages on a wide scale. There are two points of view in general, one is to advocate the participation of medical students in COVID-19 related work. The reason is that medical students have relatively professional knowledge and are easier to train as volunteers than ordinary people, and this special “teaching moment” provides them with the opportunity to exercise, and also, it helps alleviating the shortage of clinical staff caused by the rapidly expanding epidemic. While another voice is that medical students are not fully trained or qualified doctors, they should not be expected to share the same exposure factors and responsibilities. Their involvement may cause a waste of protective equipment, and working in unfamiliar environments and unknown around their own roles and the future development of the pandemic may give rise to psychological concerns, moral distress, and even legal liabilities.<sup>2</sup>

In March 2020, early days of the COVID-19 pandemic, the Association of American Medical Colleges (AAMC) and Liaison Committee on Medical Education (LCME) released a joint statement recommending an immediate suspension of medical student participation in direct patient contact,<sup>3</sup> at the Perelman School of Medicine at the University of Pennsylvania, alternative virtual course works such as e-learning modules, video clips and virtual reality simulators, were used for daily teaching.<sup>4</sup> While flexible adjustments were made in some areas, such as New York, where senior medical students were identified as potential staff members during the initial surge in COVID-19 hospitalizations, and medical students graduated early as junior physicians at NYU School of Medicine on Long Island and NYU Langone Hospital.<sup>5</sup> Australia, the UK and some other countries around the world had expressed support for medical students' involvement in the fight against the virus. Halbert<sup>6</sup> reported that despite the COVID-19 pandemic, Flinders University remained committed to providing clinical placements for medical students, they believed that the interruption of training will have an impact on future workforce planning. Allowing students to join the workforce during this period can increase their pride and understand that providing health care is not without risk, which helps to cultivate capable and work-ready practitioners.

**Table 2** Cognition and Psychological Responses of 25 Standardized Training Interns Involving the Epidemic (Hospital/Community)

	Prospective Physician (n=22)	Clinical Postgraduate (n=5)	p
How much are you worry about COVID-19 in the current clinical work during the outbreak?			
Very worried	0 (0)	0 (0)	p<0.001*
More worried	6 (27.3%)	0 (0)	
Generally worried	8 (36.4%)	2 (40%)	
Not worried	7 (31.8%)	2 (40%)	
Not worried at all	1 (4.5%)	1 (20%)	
Are you anxious about your clinical work during COVID-19?			
No anxiety	8 (36.4%)	3 (60%)	P<0.001*
Low anxiety	13 (59.1%)	2 (40%)	
Moderate anxiety	1 (4.5%)	0 (0)	
Severe anxiety	0 (0)	0 (0)	
How safe do you think the clinical environment is during the outbreak?			
Fully safe	0 (0)	1 (20%)	P<0.001*
Safe	10 (45.5%)	2 (40%)	
General safe	8 (36.4%)	1 (20%)	
Not safe	3 (13.6%)	1 (20%)	
Not safe at all	1 (4.5%)	0 (0)	
Have your hospital/community made recommendations on reducing the risk of exposure to COVID-19 in clinical work?			
Have <sup>a</sup>	15 (68.2%)	3 (60%)	P<0.001*
Establish a complete protective facilities			
Strengthen the awareness of prevention			
Basic personal protection			
Protection control			
None	2 (9.1%)	0 (0)	
Unclear	5 (22.7%)	2 (40%)	

**Note:** <sup>a</sup>Four specific aspects of the proposal. \*p<0.05.

The British government announced that medical students can choose to join the National Health Service (NHS) team in advance to provide additional support and help relieve the increasing strain put on clinical services by the spread of COVID-19, certainly, this was on a voluntary basis.<sup>7</sup> In countries such as Italy, which was badly affected in the early stages, final-year medical students and pre-med doctors are fast-tracked to the next stage of their careers through rapid assessments to help severely overstretched health workforces. Other countries, like Vietnam, Saudi Arabia and Jordan, despite many universities have closed their campuses, some medical students are still volunteering in communities and local hospitals to provide medical assistance and guidance to the public. Prior to this, all students had undergone various training sessions covering knowledge, skills and attitudes related to the COVID-19 pandemic.<sup>8,9</sup>

COVID-19 pandemic has no doubt brought a great deal of pressure for medical students, who typically show elevated anxiety rates. Nguyen et al<sup>10</sup> conducted a cross-sectional study of 5423 students from eight universities in Vietnam through an online questionnaire from April 7 to 29, 2020 to verify that the Fear of COVID-19 Scale (FCOV-19S) score is associated with medical students' health literacy and health-related behaviors. Results suggest that health literacy contributes to fear avoidance, older age, senior students, male, and the ability to pay for medication were associated with lower fear scores. Interestingly, smoking and drinking appeared to be associated with lower fear scores. To investigate the prevalence of anxiety in medical students during this pandemic. Lasheras et al<sup>11</sup> reviewed eight studies

**Table 3** Harvest and Motivation of 191 Medical Interns During the Outbreak

Gains and Challenges			
	Prospective Physician (n=22)	Postgraduate (n=5)	p
Do you think it is reasonable to arrange for continued clinical work during the outbreak period?			
Reasonable	9 (40.91%)	3 (60%)	P<0.001*
Individual opinion	12 (54.55%)	1 (20%)	
Unreasonable	1 (4.1%)	1 (20%)	
Reasons for attending clinical work during the outbreak			
Volunteer	16 (72.7%)	3 (60%)	P<0.001*
Forced and required	2 (9.1%)	1 (20%)	
Other	4 (18.2%)	1 (20%)	
What is the biggest challenge for you to work clinically during the epidemic?			
High working pressure and high intensity	8 (36.4%)	3 (60%)	P<0.001*
Lack of relevant knowledge	3 (13.6%)	1 (20%)	
Insufficient protection	7 (31.9%)	0 (0)	
None	4 (18.2%)	1 (20%)	
What is the biggest harvest for you in this epidemic? (specific harvest)			
Get knowledge and accumulate experience	11 (50%)	1 (20%)	P<0.001*
Enhance the sense of responsibility	5 (22.7%)	0 (0)	
Contribute to yourself	1 (4.5%)	2 (40%)	
The importance of physical and mental health	2 (9.1%)	0 (0)	
None	3 (13.6%)	2 (40%)	
Reasons and Motivation (n=191)	Frequency		
<b>The reason of hesitation about whether to enter clinical work</b>			
Fear for own's health	136 (71.2%)		
Fear for family's health	169 (88.48%)		
Fear of harming patients	106 (55.5%)		
Inadequate PPE	146 (76.44%)		
Absence of a cure	70 (36.65%)		
<b>If you are volunteering for clinical work, then the reason is</b>			
1. Obligation as a medical student (sense of social responsibility)	177 (92.67%)		
2. Shortage of medical personnel	143 (74.87%)		
3. I develop my professional job profile	119 (62.3%)		
4. I will take pride in contributing	108 (56.54%)		
5. Precautions have been taken to prevent me from getting infected during work Supervision	80 (41.88%)		
6. It is expected from me	76 (39.79%)		
7. Solicited by the government or medical institutions	68 (35.6%)		
8. Educational incentive	68 (35.6%)		
9. Remuneration	63 (32.98%)		
10. I become part of a historic event	53 (27.75%)		
11. Compensated by money if infected by COVID- 19	27 (14. 14%)		
12. Compensated by money if death due to COVID- 19 occurs	27 (14. 14%)		
13. I will receive supervision in my work	22 (11.52%)		

Note: \* $p < 0.05$ .

Abbreviations: COVID-19, Coronavirus disease 2019; PPE, Personal protective equipment.

for both qualitative and quantitative analysis and concluded that the estimated correlation of anxiety was 28% (95% CI: 22–34%), with significant heterogeneity between studies. The prevalence of anxiety among medical students is similar to that before the pandemic, but is associated with a number of specific COVID-related stressors.



We investigated two groups of students in our training system and found that those prospective physician with salary were more willing to participate in epidemic-related work, although there were also a lot of psychological pressure, no students were infected because of related work. Psychological responses were divided into 5 levels, most of the students showed mild to moderate degree of worry, anxiety and security. While the interesting finding showed that clinical graduate group, who expressed not know much about the protection policy, was less worried and anxious than prospective physician. Almost all the students received training from the school and were taken protective measures, while there were some students do not know enough about it. Lack of proper knowledge and skills may not only lead students to be fearless out of ignorance, but may also cause them to overestimate risks and increase their stress and anxiety levels.

A comparative study of social groups in Iran showed that the prevalence of stress, anxiety and depression was higher among medical students than among students in other majors.<sup>12</sup> A study in Saudi Arabia<sup>8</sup> showed that female medical students had higher stress levels than male medical students, despite having less contact with patients, junior medical students reported higher levels of anxiety than their senior colleagues. Courses about epidemic disease are covered in regular medical education all around the world, but the real global pandemic is rare, few students consider infectious disease as a possible future career. Facing the sudden outbreak, students' psychological state and expectations for the future have been greatly affected. In a letter to the editor of Medical Education Online, Elsayw et al<sup>13</sup> expressed that as a result of COVID-19, their students are missing out on the opportunity to experience the major they are interested in for a long time, in the short term, they are missing out on exploring possible career paths, and in the long term, these students are at a competitive disadvantage when applying for professional training. Because their peers can better demonstrate commitment to their profession through elective placement. This may affect students' expectations for the future.

Alsoghair et al<sup>8</sup> conducted a survey and analysis of COVID-19 related knowledge, prevention behaviors and risk perceptions among fourth and fifth grade medical students and interns in Qasim, Saudi Arabia, results showed that these medical students displayed sufficient knowledge about the COVID-19 pandemic and preventive behaviors and had a good level of risk cognition. Notably, younger medical students scored lower, suggesting that their knowledge and risk perception of COVID-19 must be improved as they may be a potential source of community health information. Western Uganda is known for outbreaks of viral haemorrhagic fevers, so health care professionals and trainees have a higher level of awareness and familiarity with appropriate precautions, Olum et al<sup>14</sup> identified the knowledge, attitudes and practices of Ugandan medical students, they reported that despite the lockdown, more than 80% of medical students have participated in health education aimed at increasing public understanding of COVID-19, and Uganda's medical students have enough knowledge about COVID-19 to be a huge stock of health care responses when needed.

To better understand the reasons why these students volunteered for front-line clinical support, we investigated the interns' harvest, motivation and concerns for participating in the pandemic. More than 50% of the students chose "obligation as a medical student (sense of social responsibility)", "shortage of medical personnel", "I develop my professional job profile" and "I will take pride in contributing". These reasons were quite similar to a survey from England which showed reasons for medical students to volunteer: to contribute, to learn, to get paid and to take part in an activity during the national lockdown.<sup>1</sup> In March 2020, Astorp et al<sup>15</sup> designed a cross-sectional study to identify what motivates medical students to join a pandemic emergency healthcare workforce in Aalborg University, results showed that the median scores of motivational statements in each area were: Care; Learning; Pride; Team; Needs; Safety; Supervision; Work; Responsibility; Salary and Historic. Supervision, salary and responsibility become more important as the years of study lengthen. There were other reports also showed that participants considered working on the front lines of the pandemic to be a positive learning experience, which helped improve their technical and communication skills, positively impacting their learning.<sup>16,17</sup>

Our results also suggested that protective measures are the main concern of all students and stuffs facing the risk activities, especially in the early unprepared stage of the epidemic, personal protective equipment training need be included in routine rotation training of students. Proper understanding and reasonable allocation of protection equipment are guarantee of saving resources and avoiding unnecessary waste while ensuring safety. Optimized management of student clinical practice include distributing the position reasonably, consult with supervisors about the high-risk activities, keep all students in order and control. Those in charge must communicate compassionately, clarify current

best practices, manage expectations, work hours, and provide adequate resources and effective personal protective equipment (PPE).

This study has the following limitations. The results from this study are self-reported based on a self-designed questionnaire and depend heavily on the honesty of the participants, as well as bias caused by recall. Importantly, the study took a cross-sectional approach and surveyed only one hospital in Jilin Province, with a small number of participants, and was not representative. In addition, we did not quantify such things as anxiety and worry levels and safety in the questionnaire to allow comparison and contrast with the results of similar studies elsewhere. Of course, this study has some limitations, but it also provides suggestions for the management of medical students during COVID-19.

## Summary

Until today, the impact of COVID on China still persists, the standardized training for medical students has been severely impacted, whether medical students choose to protect others or be protected by others has always been a difficult problem to grasp. Although circumstances, cultures, outbreaks and strategies for coping with COVID-19 varied around the world, all studies show that positive, problem-oriented coping strategies are the most common and effective. A standardized guarantee system including professional knowledge training, protective measures, psychological care, optimized management and positive propaganda pathway should be established. The main component of expertise training should be education on pandemic knowledge and prevention behaviours and average level of risk perception, and the development and wide distribution of clear clinical practice guidelines.<sup>18</sup> Attention should be paid to improving the social status of infectious diseases in medical education and cultivating future doctors with epidemic prevention and control awareness. We also recommend fostering resilience by spreading positive messages that emphasize appreciation for the dedication and altruism of clinicians.<sup>19,20</sup> Extra pay and encouragement are necessary. With the continuation of the epidemic and the in-depth understanding of COVID, the psychological state of us will be very different from the initial time, and the follow-up survey data are in the process of summarizing.

## Data Sharing Statement

The data that support this study cannot be publicly shared due to ethical or privacy reasons and may be shared upon reasonable request to the corresponding author if appropriate.

## Ethics Approval and Consent to Participate

The study was approved by the Institutional Education Review Board of China-Japan Union Hospital of Jilin University (code of ethics: CJUH20202126). Informed consent was obtained from all participants in the survey.

## Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

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## Disclosure

The authors declare no competing interests in this work.



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