

Willingness of Medical Undergraduates to Work as Volunteers for anti-epidemic of COVID-19: Reflections on Medical Education in the post-epidemic era of China

Ye Feng

Chengdu Medical College

Xin Zhang

Sichuan University

Hui Wang

Chengdu Medical College

Yutong Pan

Chengdu Medical College

Shunrui Chen

Chengdu Medical College

Zhaoqiong Chen

Chengdu Medical College

Jian Chen

Chengdu Medical College

Xin Liu

Chengdu Medical College

Weizhong Chen

Chengdu Medical College

Can Zhang (✉ 416530484@qq.com)

Chengdu Medical College

Chunxiao Mou

Chengdu Medical College

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Abstract

Objective To identify the willingness of medical undergraduates to work as volunteers for fighting COVID-19 and effect factors of willingness to volunteer.

Methods A cross-sectional online questionnaire survey which consisted of three sections with 26 items was conducted. The primary outcome was the willingness to volunteer. Descriptive analysis was used for the results of characteristics, a univariant analysis was performed by chi-square test and a multivariate analysis was performed by multivariate logistic regression.

Results A total of 5499 questionnaires were issued and 5379 effective questionnaires were finally recovered. There were 1797 males (33.4%) and 3582 females (66.6%), with an average age of 20 ± 1.5 years old. 3553(66.1%) students wanted to volunteer. Male was associated with less adjusted OR (0.68, 0.56 to 0.81) for willingness. The undergraduates in school of public health was most (3.81, 2.26 to 6.40) willing to work. The undergraduates who had often participated in voluntary activities but not regularly was 3.23(2.03-5.16) times more willing than those that never participate.

Conclusion It suggested that medical educators should emphasize voluntary activities in undergraduate medical education and continue to insistence of medical humanities and public health education to improve the social responsibility and professional identity of medical undergraduates.

Introduction

There's an outbreak of a novel coronavirus (SARS-CoV-2) infection since December 2019, and caused atypical pneumonia called coronavirus disease 2019 (COVID-19)(1). Currently, there have been more than 70 million confirmed cases of COVID-19 and more than 1.6 million deaths globally since the start of the pandemic(2). The WHO issued a public health emergency of international concern(PHEIC) on 30 January 2020(3).

After the epidemic of COVID-19 in Wuhan was completely resolved, several clusters of outbreaks occurred in other cities of China, which had been controlled through precise tracking, comprehensive testing and mass prevention and control, so that no community transmission had occurred in China (4). At present, the new cases in the mainland of China are all imported and related cases(5), and transmission routes included not only imported human-to-human, but also imported object-to-human. Therefore, it is very necessary to conduct screening and centralized isolation of people entering China and inspect the entering goods. The standardized implementation of above measures requires an enormous amount of works from professionals.

Meanwhile, medical services are under pressure as cases surge in countries across the world which leads to the global shortage of medical personnel(6). Nearly all countries (90%) have experienced disruption to health services, with low and middle-income countries reporting the greatest difficulties(7). A large number of medical related professionals are needed not only in clinical treatment, but also in the whole

process of disease control and prevention. Medical undergraduates, as a reserve of professionals, could be largely explored to supplement the existing deficiencies.

The purpose of this study is to understand the willingness of medical undergraduates to work as anti-epidemic volunteers and its effect factors, so as to provide reference for better guiding and carrying out anti-epidemic voluntary activities and to provide basis for adjusting contents of medical college personnel training to adapt to the demand of the society which will have been experiencing the epidemic for an uncertain period.

Methods

Study design and Participant

A cross-sectional questionnaire survey was conducted among the full-time students from Grade 2015 to Grade 2019 in the school of clinical medicine, nursing, pharmacy, public health, laboratory medicine, psychology, biological sciences & technology and great health & intelligence engineering. Taking these undergraduates as the participant, a total of 5499 questionnaires were issued which with a response time less than 100 seconds and ages other than 15–27 years old were excluded. 5379 effective questionnaires were finally recovered, with a recovery rate of 97.8%. This study was approved by the Medical Ethics Committee of Chengdu Medical College and all questionnaires were conducted with the informed consent of the respondents. All methods were performed in accordance with the relevant guidelines and regulations.

Questionnaire Design

It was a self-designed questionnaire referring to relevant studies(8, 9), which consisted of three sections with 26 items, including demographic information and family situation (Cronbach's $\alpha = 0.82$), general knowledge of COVID-19(Cronbach's $\alpha = 0.78$) and willingness to work against the epidemic of COVID-19(Cronbach's $\alpha = 0.75$).

Data Analysis

Quantitative data were described by $\bar{x} \pm s$, Qualitative data were described by N (%). The univariate analysis was performed by chi-square test and the multivariate analysis was performed by multivariate logistic regression. Both were used to determine the influence of medical undergraduates with different characteristics on willingness to volunteer. SPSS statistics 22.0 was used to analyze data and the test level was set as 0.05, unless otherwise specified.

Results

The Characteristics of Participants

A total of 5499 questionnaires were issued which with a response time less than 100 seconds and ages other than 15–27 years old which were recorded by school were excluded. 5379 effective questionnaires

were finally recovered, with a recovery rate of 97.8%. As can be seen from Table 1, there were 1797 males (33.4%) and 3582 females (66.6%) among 5379 valid questionnaires, with an average age of 20 ± 1.5 years old. Most students (35.4%) were from school of clinical medicine, 16% were from school of pharmacy, 14.7% were from school of laboratory medicine, 10.9% and 10.6% were from school of great health and intelligence engineering and school of nursing. 6.7% of students came from school of public health, 4.2% of students came from school of biological sciences and technology. And only 1.6% of students were from school of psychology.

General knowledge of COVID-19 and voluntary activities against COVID-19

From Table 2, most students (59.3%) spent less than 30 minutes learning about this outbreak, 28.4% of students spent 30–60 minutes on it, 10.9% of students spent more than 60 minutes and only 1.4% of students took no time on it. Most students basically understood the general knowledge of COVID-19. 766 (14.2%) students understood the route of COVID-19 very well, 683 (12.7%) students understood the population of COVID-19 very well and only 364 (6.8%) students understood the source of COVID-19. The number of 1946 (36.2%) students had known the voluntary activities, and among them, 1204 (22.4%) students achieved information from main stream media, like TV and newspaper, 893 (16.6%) students achieved information from notification of university or class, 809 (15%) students achieved information from community, 491 (9.1%) students achieved from people around, 1569 (29.2%) students achieved from internet media such as Wechat, Weibo, etc. and 78 (1.5%) students achieved from other access.

Table 1 The Characteristics of Participants

Variables	Group	Numbers/ Mean n (%)
Gender	Male	1797(33.4%)
	Female	3582(66.6%)
Age		20±1.5
School	Clinical Medicine	1903(35.4%)
	Nursing	568(10.6%)
	Pharmacy	860(16.0%)
	Laboratory Medicine	793(14.7%)
	Public Health	359(6.7%)
	Psychology	85(1.6%)
	Biological Sciences and Technology	227(4.2%)
	Great Health and Intelligence Engineering	584(10.9%)
	Major	Medical
	Nursing	570(10.6%)
	Public Health	421(7.8%)
	Medical Technology	1926(35.8%)
	Health and Medical Administrative Services	688(12.8%)
Grade	First	1689(31.4%)
	Second	1450(27.0%)
	Third	1200(22.3%)
	Fourth	1012(18.8%)
	Fifth	28(0.5%)
Whether be admitted to the first choice	Yes	3649(67.8%)
	No	1730(32.2%)
Birth Place	Urban	2061(38.3%)
	Rural	3318(61.7%)
Single Child	Yes	2023(37.6%)
	No	3356(62.4%)
Family structure	Family of origin (father and mother, may include siblings)	4575(85.1%)
	Family with single parent (father or mother, may include siblings)	436(8.1%)
	Reorganized family (one parent and stepparent, may include siblings)	325(6.0%)
	Others (other situations)	43(0.8%)
Whether the family members are related to medical and health occupations	Yes	713(13.3%)
	No	4666(86.7%)

Table 2 General Knowledge of COVID-19 and Voluntary activities against COVID-19

Variables	Group	Numbers n (%)
The average time per day to learn about epidemic of COVID-19	Time \geq 60min	590(10.9%)
	30min \leq Time \leq 60min	1526(28.4%)
	Time \leq 30min	3190(59.3%)
	Take no time	73(1.4%)
Knowledge of source of COVID-19	Very well understood	364(6.8%)
	Basically understood	4222(78.5%)
	Uncertain	723(13.4%)
	Basically not understood	64(1.2%)
	Very little understood	6(0.1%)
Knowledge of route of COVID-19	Very well understood	766(14.2%)
	Basically understood	4235(78.7%)
	Uncertain	335(6.2%)
	Basically not understood	37(0.7%)
	Very little understood	6(0.1%)
Knowledge of population of COVID-19	Very well understood	683(12.7%)
	Basically understood	3987(74.1%)
	Uncertain	649(12.1%)
	Basically not understood	53(1%)
	Very little understood	7(0.1%)
Whether to know voluntary activities of COVID-19	Yes	1946(36.2%)
	No	3433(63.8%)
The access to get information about voluntary activities of COVID-19	Main stream media, like TV and newspaper	1204(22.4%)
	Notification from university or class	893(16.6%)
	Notification from community	809(15%)
	Notification from people around	491(9.1%)
	Internet media like Wechat, Weibo, etc.	1569(29.2%)
	Others	78(1.5%)

Table 3 Willingness to Volunteer for fighting COVID-19

Variables	Group	Numbers n (%)
Participation of voluntary activities before	Often but not regularly	384(7.1%)
	Regularly	85(1.6%)
	Occasionally	3203(59.5%)
	Never	1707(31.7%)
Whether be willing to participate in voluntary activities of COVID-19	Yes	3553(66.1%)
	Uncertain	1152(21.4%)
	No	674(12.5%)
Which kind of volunteer service is willing to participate	Professional health-care	772/2871(26.9%)
	Psychological counseling	308/2871(10.7%)
	Management of order maintenance	506/2871(17.6%)
	Public service	1285/2871(44.8%)
	The motivation to participate in voluntary activities of COVID-19(multiple choice)	The affection for the country
	The compassion for the people's suffering	1650(30.7%)
	The full play of expertise	1584(29.4%)
	Making contribution to society	2722(50.6%)
	The experience gained from voluntary activities	1548(28.8%)
	Others	60(1.1%)
The reason for hesitation or unwillingness to volunteer	Fear of being infected	1216(22.6%)
	Disagreement of family	1386(25.8%)
	Physical discomfort	404(7.5%)
	Other important things needed to do	1097(20.4%)
	Others	437(8.1%)
	What kind of supporting measures do you want most when volunteering	Distribution of personal protective equipment (PPE)
Reasonable working hours and working intensity		4023(74.8%)
Provision of food		3213(59.7%)
Provision of travel		2911(54.1%)
Certain rewards		1117(20.8%)
Professional guidance		4314(80.2%)
Others		111(2.1%)

Willingness to volunteer for COVID-19

The number of 3553(66.1%) students wanted to participate in voluntary activities of epidemic, 1152(21.4%) students hesitated to participate and 674(12.5%) students were unwilling to participate. In school of clinical medicine, 1278 students, accounting for 67.2%, were willing to work as volunteers. In school of nursing, the number was 395(69.5%). And in other schools, the figures were 538 students (62.6%) for the school of pharmacy, 518 students (65.3%) for the school of laboratory medicine, 280 students (78%) for the school of public health, 57 students (67.1%) for the school of psychology, 144

students (63.4%) for the school of biological sciences and technology and 343 students (58.7%) for the school of great health and intelligence engineering. Among all the students who were willing to be volunteers, most (1237, 23.9%) chose to serve in public service, 772(14.4%) students chose to be professional health-care, 506(9.4%) students chose management of order maintenance and 308(5.7%) students chose psychological counseling. The motivation to work as volunteer consisted of making contribution to society (50.6%), the affection for the country (38.1%), the compassion for the people's suffering (30.7%), the full play of expertise (29.4%) and the experience gained from voluntary activities (28.8%). The reason why students were hesitant or unwilling to volunteer was fear of being infected (22.6%), disagreement of family (25.8%), physical discomfort (7.5%) and other important things needed to do (20.4%). When volunteering, the most needed supporting measures they concerned were distribution of personal protective equipment (PPE) (87.2%) and professional guidance (80.2%). Reasonable working hours and working intensity (74.8%), provision of food (59.7%) and travel (54.1%), and certain rewards (20.8%) were also needed. The above results were presented in Table 3.

Factors associated with willingness to work

The Univariate Analysis

As can be seen from Table 4, genders, majors, being the single child, admission to the first choice, previous experience in voluntary activities, understanding voluntary activities of COVID-19, understanding COVID-19, as well as the time per day they spent understanding the epidemic, above all which have impacts on their willingness to work as volunteers in the epidemic of COVID-19.

The Multivariate Analysis

In the multivariate analysis of the willingness to work as volunteers, the multivariate logistic regression model was fitted with the variables that were statistically significant in the univariate analysis and those that were professionally significant. The specific results are shown in Table 5. Male was associated with 0.68(95%CI 0.56 to 0.81) adjusted OR for willingness compared with female. The undergraduates in school of public health was most (3.81, 95%CI 2.26 to 6.40) willing to work than those in school of great health and intelligence engineering. The undergraduates that were accepted to their first choice was 1.41(95%CI 1.16 to 1.71) times more willing than those were not. The undergraduates that were single child (0.72,95%CI 0.60 to 0.87) and born in urban (0.75,95%CI 0.62 to 0.91) both were less willing than those were not. The undergraduates who had often participated in voluntary activities but not regularly was 3.23(95%CI 2.03–5.16) times more willing than those that never participate.

Discussion

As the results showed above, willingness to volunteer increased with age. The literatures also support this(10, 11). Although the respondents were all undergraduates with a relatively small age span, compared with freshmen, senior students had a richer reserve of professional knowledge, had been more influenced by medical humanities, and had a stronger sense of social responsibility as they were about to step into the society which support their more willingness to participate in voluntary activities.

Being female was positively associated with willingness to volunteer. Previous studies both support and contradict this finding. Most of the studies supporting this finding focused on nurses' or nursing students' willingness to work(12), among which female respondents accounted for an overwhelming proportion. It was possible that the ethic of care can be attributed to a gendered socialization and the type of person who chose to enter the nursing profession(10, 12). Meanwhile, in the inconsistent studies, Aoyagi and Ives(13, 14) both mentioned that childcare obligation was a consistent barrier to female's willingness as female always took primary responsibility for childcare which might be related to the less willingness of female to volunteer. However, in our study, the respondents were undergraduates with no children and little responsibility for childcare which should have made the result closer to the true willingness of different gender.

The undergraduates from school of clinical medicine, nursing and public health were more likely to participate the voluntary activities of COVID-19. This was also consistent finding across most studies, especially the clinical medical and nursing students(12-14). In contrast, few studies had mentioned students of public health. In our study, undergraduates majoring in public health had a very strong desire (OR 3.81, 95%CI 2.26-6.40) to participate in voluntary activities of COVID-19. This might because the epidemic had strengthened students' sense of professional identity and social responsibility, and they considered COVID-19, a public health emergency of international concern issued by WHO, might have something to do with their profession. However, gaps in previous research may be related to the neglect of public health around the world, as evidenced by the pandemic of COVID-19. Therefore, it is necessary to popularize public health training in medical undergraduates can improve their vision and responsibility of global health.

Admission to the first choice, not being the single child and born in the rural area were all positive factors associated with willingness to participate voluntary activities. These factors are essentially non-modifiable and statistically proven influencers of willingness to work, which is important information for both policy makers and medical education managers. Even though they are difficult factors to influence, we can strengthen the opposite students' medical humanities and social responsibility education to influence them to become more willing to volunteer.

Past volunteerism experience was an important effect factor. Comparing with non-participation, whether the frequency of participation was frequent but irregular, regular or occasional, there was a significant positive correlation with willingness to volunteer. This was an important inspiration for medical education administrators, who should emphasize voluntary activities in undergraduate medical education, incorporate vacation voluntary activities into practical assessment and various awards evaluation, which could directly and positively encourage medical undergraduates to actively participate in voluntary activities.

Among the students who were willing to volunteer, most chose public service which did not require medical skills, while only less than one third chose professional health-care. When asked what was most needed for participating in COVID-19 related voluntary activities, more than 80% of the students answered

that professional guidance was needed. These indicated that students were lack of training so that they were not confident in their medical professional skills, and previous study had also pointed out that well professional skills directly affected their willingness and ability to participate in voluntary activities(15). This proved once again the necessity of organized and regular voluntary activities in undergraduate education in medical colleges.

The average time and extent of understanding COVID-19 also had a significant impact on willingness to volunteer. The most access to learn about voluntary activities was through internet media, followed by mainstream media. Less than one fifth got the information from university or class. Medical colleges can keep in touch with relevant medical institutions and send volunteers there who have been uniformly trained and selected by the colleges as soon as necessary.

During this outbreak, countless health workers were called or volunteered to work on the front lines, while regrettably seeing health workers in some countries and regions go on strike. The ethics of volunteering during a pandemic lead necessarily to a debate regarding an ethical duty to care(10). Daniel(16) stated the erosion of this sense of duty. While Huber(17) thought the duty of care was much more explicit during infectious disease outbreaks. Even previous studies had been asserted that immediate action is required to make such a duty explicit to healthcare workers and set it out(10). However, duty of care could be used to restrain medical workers, but not medical students. In our study, more than half of the students in each major were willing to volunteer, which clearly support Huber's(17) view. The motivation for choosing the most is to make a contribution to society, followed by the affection for the country and the compassion for the people's suffering. These were the reaching consequence of adhering to medical humanities education. In the global fight against COVID-19, the importance of medical humanities education shouldn't have been ignored.

Table 4 Univariate analysis of willingness to volunteer for fighting COVID-19

Variables	Group	Willingness to volunteer n (%)	χ^2	P
Gender	Male	1123(62.5)	23.670	<0.001
School	Clinical Medicine	1278(67.2)	60.493	<0.001
	Nursing	395(69.5)		
	Pharmacy	538(62.6)		
	Laboratory Medicine	518(65.3)		
	Public Health	280(78.0)		
	Psychology	57(67.1)		
	Biological Sciences and Technology	144(63.4)		
	Big Health and Intelligence Engineering	343(58.7)		
Whether be admitted to the first choice	Yes	2475(67.8)	21.296	<0.001
Single Child	Yes	1291(63.8)	9.742	0.008
Participation of voluntary activities before	Never	976(57.2)	148.293	<0.001
	Occasionally	2192(68.4)		
	Regularly	70(82.4)		
	Often but not regularly	315(82.0)		
The average time per day to understand the outbreak of COVID-19	Take no time	29(39.7)	147.458	<0.001
	Time<30min	1965(61.6)		
	30min≤Time<60min	1103(31.1)		
	60min≤Time<90min	250(72.3)		
	Time≥90min	206(76.3)		
Knowledge of route of COVID-19	Very well understood	594(76.5)	147.000	<0.001
	Basically understood	2785(65.8)		
	Uncertain	163(48.7)		
	Basically not understood	10(27.0)		
	Very little understood	1(16.7)		
Knowledge of population of COVID-19	Very well understood	536(78.5)	182.458	<0.001
	Basically understood	2663(66.8)		
	Uncertain	3375(1.9)		
	Basically not understood	16(30.2)		
	Very little understood	1(14.3)		
Whether to know voluntary activities of COVID-19	Yes	1538(79.0)	235.290	<0.001

Table 5 Multivariate logistic regression of willingness to volunteer for fighting COVID-19

Variables	Group	OR	95%CI	P
Age		0.92	0.87-0.98	0.009
Gender	Male	0.68	0.56-0.81	<0.001
School	Clinical Medicine	1.43	1.06-1.92	0.018
	Nursing	1.07	0.71-1.61	0.129
	Pharmacy	1.12	0.82-1.54	0.476
	Laboratory Medicine	1.13	0.82-1.56	0.470
	Public Health	3.81	2.26-6.40	<0.001
	Psychology	0.63	0.33-1.21	0.168
	Biological Sciences and Technology	1.51	0.93-2.46	0.098
	Great Health and Intelligence Engineering			
Whether be admitted to the first choice	Yes	1.41	1.16-1.71	0.001
Birth Place	Urban	0.75	0.62-0.91	0.004
	Rural			
Single Child	Yes	0.72	0.60-0.87	0.001
Participation of voluntary activities before	Often but not regularly	3.23	2.03-5.16	<0.001
	Regularly	1.51	0.72-3.17	0.278
	Occasionally	1.80	1.50-2.16	<0.001
	Never			
The average time per day to understand the outbreak of COVID-19	Time \geq 90min	4.31	2.04-9.13	<0.001
	60min \leq Time \leq 90min	5.55	2.63-11.70	<0.001
	30min \leq Time \leq 60min	3.58	1.97-6.51	<0.001
	Time \leq 30min	2.12	1.20-3.76	0.010
	Take no time			
Knowledge of population of COVID-19	Very well understood	22.02	2.30-210.53	0.007
	Basically understood	17.264	1.83-162.56	0.013
	Uncertain	11.32	1.19-107.35	0.034
	Basically not understood	3.46	0.33-35.98	0.299
	Very little understood			
Whether to know voluntary activities of COVID-19	Yes	2.54	2.05-3.16	<0.001

Declarations

Availability of data and materials

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

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Ethics approval and consent to participate

This study was approved by the Medical Ethics Committee of Chengdu Medical College and all questionnaires were conducted with the informed consent of the respondents. All methods were performed in accordance with the relevant guidelines and regulations.

Consent for publication

Not applicable.

Competing interests

The authors declare that they have no competing interests.

Authors' information

Affiliations

School of Public Health, Chengdu Medical College, Chengdu, China

Ye Feng✉Zhaoqiong Chen✉Jian Chen✉Xin Liu✉Weizhong Chen

Pneumology Group, Department of Integrated Traditional Chinese and Western Medicine, Clinical Research Center for Respiratory Disease, West China Hospital, Sichuan University, Chengdu, China.

Xin Zhang

School of Clinical Medicine, Chengdu Medical College, Chengdu, China

Hui Wang✉Yutong Pan✉Shunrui Chen✉Chunxiao Mou

Can Zhang

Contributions

Y.F., X.Z. and H.W. wrote the main manuscript text. Z.C. and J.C. designed the questionnaire. C.M., X.L. and C.Z. contributed to conducting the survey and collecting data. Y.P., S.C. and W.C. contributed to data analysis. All authors reviewed the manuscript.

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