



Knowledge of COVID-19 and Willingness to Participate in Medical Response to It among Clinical-Level Medical Students in a Nigerian University

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Authors' contributions

This work was carried out in collaboration among all authors. Author SRO designed the study, developed the questionnaire and wrote the first draft of the manuscript. Author SGM took part in writing the first draft and in editing the questionnaire. Authors SGM and INA undertook the literature searches. Author IFA took part in editing the questionnaire. All authors read and approved the final manuscript.

Article Information

DOI: 10.9734/JAMMR/2021/v33i1731026

Editor(s):

(1) Dr. Sevgul Donmez, Mugla Sıtkı Kocman University, Turkey.

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Complete Peer review History: <https://www.sdiarticle4.com/review-history/70134>

Original Research Article

Received 22 May 2021

Accepted 09 July 2021

Published 28 July 2021

ABSTRACT

Aims: To determine medical students' knowledge of COVID-19 pandemic and their willingness to participate in medical response to it and the associated factors.

Study Design: Cross-sectional study involving use of online self-administered questionnaire developed by the author was administered to clinical level medical students.

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Place and duration of study: Enugu State University College of Medicine from 16th September 2020 to 27th November 2020.

Methodology: There were 177 participants in this study comprised of 79 males and 89 females with 21, 24, 110, and 22 at 300 level, 400 level, 500 level and 600 level of study respectively. The questionnaire was sent to the representative of each class after discussions with them about the research work. They then transmitted the questionnaire to their class WhatsApp platform with an accompanying request for the completion of the questionnaire.

Result: Most participants (145; 81.9%) have good knowledge level of the virus and pandemic. Age ($p < .05$) and year of study ($p < .05$) significantly affect knowledge level. Most students, 113(63.8%) were willing to participate in the response to the pandemic; the most avowed reasons were to gain skill as future members of the health team, 100(88.5%) and as a sense of duty if called upon by government 69(61.1%). Main reason for unwillingness was fear of contracting the infection (20; 90.9%) coupled with lack of PPE (16; 72.7%). Knowledge level about the pandemic did not significantly affect willingness to participate in the response to it. Most respondents were more willing to participate in non-PPE-requiring tasks 103(91.2%) than in others.

Conclusion: Medical students in our center are knowledgeable regarding COVID-19 pandemic and are willing to participate in response to COVID-19 pandemic especially if suitable environment is provided.

Keywords: Medical students; willingness; COVID-19 pandemic; response; knowledge.

1. INTRODUCTION

The novel corona virus disease 2019 (COVID-19) caused by SARS-CoV-2 was declared a pandemic by the World Health Organization (WHO) on January 11, 2020 few months after it was first diagnosed in Wuhan, China [1]. It is a highly infective disease with basic reproduction number, R_0 , (the average number of new infections produced by one infected person in a population without immunity) estimated by different authors to range from 2 to 5.7 [2,3,4]. As of 25 December 2020, global confirmed cases of the disease was 78,194,947 with 1,736,752 deaths [5] while Nigeria which recorded her first case on 28 February 2020 had recorded 78, 434 and 1, 221 confirmed cases and deaths respectively as of 19 December 2020 [6].

The virus spreads from human to human via aerosolized respiratory droplets from an infected person and by direct contact through handshakes and hugs etc [7]. Mild forms of the disease present with flu-like symptoms while its severe forms present with pneumonia-like symptoms including high fever, cough, moderate to severe breathlessness among others. Other associated symptoms include fatigue, malaise, anosmia and diarrhea [2]. Understanding of the pathophysiologic mechanisms of the disease is still evolving. It has been observed that underlying health conditions and old age increase risk for of the disease and worsen morbidity and mortality [8]. Case fatality ratio is reported to be higher in developed countries with

death reported to be disproportionately higher among Blacks, Asians and Minority Ethnic (BAME) groups than the Caucasians in those places [8]. In contrast, the disease is known to have low mortality among indigenous black Africans [8].

COVID-19 has put a severe strain on health care systems the world over in a manner unknown in recent history prompting nations to adopt various coping mechanisms including in areas of augmenting human resources for health (HRH). Measures adopted to augment HRH for the pandemic include recalling retired healthcare workers, licensing final year medical students without final/exit examinations, graduating final year medical students to join in the COVID-19 response and drafting medical students into some aspects of COVID-19 care [9,10,11,12]. Our country Nigeria through the Federal Ministry of Health also called upon retired medical personnel to re-join the healthcare workforce for the purpose of combating the virus. Though there are arguments against medical students participating in fight against the virus[11], it is the view of some clinicians that during the pandemic, medical students could be useful in areas of health education on COVID 19, triaging of patients, management of mild COVID 19 disease, and other routine care e.g. in ante-natal patients [11,13]. These workers argue that participation of medical students in these areas will ease pressure on doctors thereby freeing up the already stretched workforce to provide care for severe COVID-19 cases. However, it has

been reported that medical students' involvement in combating epidemics in the past resulted in high levels of stress and anxiety in them which went on to affect their education and psychological health [14]. Fundamental to the participation of medical students in response to COVID-19 is their willingness to do so. The choice to help others by taking part in what is ordinarily is not one's duty as exemplified in medical students' willingness to participate in COVID-19 care is a behavioural trait. Understanding the reasons for this will help in organizing volunteerism in a pandemic. The motivations for such behaviour have been identified to include sense of value (altruism and humanitarian values), need to enhance one's understanding (acquisition of new knowledge or skills) and social benefits (opportunities to establish relationships and add self-esteem) [15].

The aim of this study was to determine medical students' knowledge of COVID-19 pandemic, their willingness to participate in the medical response to the pandemic and the factors associated with this willingness. Information obtained from the study may be useful in modifying the response for the current pandemic and/or for planning the response to another disease outbreak. To the best of our knowledge there has not been a published work on the knowledge and willingness of medical students to participate in response to COVID – 19 from our region.

2. METHODS

This was an institution-based descriptive cross-sectional study carried out in South Eastern part of Nigeria. In our country, University education is ran by both federal and state governments as well as private individuals or organizations. Our medical school is located in the heart of the state capital and became one of the epicenters of the response efforts to the COVID-19 pandemic in the state. The study population was the undergraduate medical students in the College of Medicine of Enugu State University of Science and Technology, a state university. Students from the 300 to 600 level of study were eligible to participate. This population was chosen because as clinical level students, they are the group that has some experience with patient care and also they are those likely to be recruited if medical students are to be drafted into the COVID-19 response efforts. Sample size for this study was determined using the Slovin's formula, $n = \frac{N}{1+N(e)^2}$ (where n = sample size; N =

population size, 281; e = random sampling error, 0.05). The calculated minimum sample size of the participants was selected by the simple random sampling method. Ethical clearance with number ESUTHP/C-MAC/RA/034/VOL.2/65 was obtained from the Health and Research Ethics Committee of the teaching hospital. Informed consent was obtained from each participant and they were assured of their confidentiality.

An online self-administered structured questionnaire generated by the researchers was used for data collection. It was pretested among a segment of the study population to ensure the validity of the questionnaire for collecting the data sought and that participants could understand the questions using the face validity and content validity tests. Once verified, the questionnaire was sent through each class representative to the class's WhatsApp platform with a brief request that they complete the forms. The students were assured that participation in the study was entirely voluntary and they could opt out any time before submitting their questionnaire. For the assessment of participants' knowledge, a 15-item question about the disease was included in the questionnaire. The components of knowledge tested include the type and characteristics of the virus, the methods of transmission and prevention, the severity of the infection, mortality level and associated factors. A correct response was scored 1 while an incorrect one was scored zero. The responses were summed up with the lowest score being 7 and the highest, 15. The scores were then categorized into two using the mean score of 11.95 as the cut off score. Students with scores below 11.95 are categorized as having poor knowledge while those with scores above were categorized as having good knowledge.

Data were entered, cleaned and analyzed using Statistical Package for Social Sciences (SPSS) version 22. Results are presented as frequencies in tables and cross-tabulations. Chi square was used to test for significance at bivariate level while logistic regression was used to determine predictors of willingness to participate in the medical response to COVID-19. Level of statistical significance was set at a P -value of < 0.05 .

3. RESULTS

One hundred and seventy seven (177) clinical-level medical students participated in this study. As shown in Table 1, the mean age of

respondents was 21.9± 3.6 years with the modal age range (70.1%) within 20 to 25 years. Majority were females (98; 55.4%) and in 500 level of study (110; 62.1%). A greater proportion of the students (50.3%) were of the Roman Catholic religious orientation.

Table 2 shows distribution of respondents' knowledge about COVID-19. Most respondents 145(81.9%) showed a good knowledge level of

the virus and the pandemic while 32 (18.1%) showed poor knowledge. The mean knowledge score was 11.95 (standard deviation, 1.921).

Fig. 1 shows a distribution of participants' sources of information about COVID-19 pandemic. The most common source of information for our participants were the social media, 67 (37.9%) while the least used source was webinars, 3 (1.7%).

Table 1. Socio-demographic characteristics of participants

Variable	N=177	Percent (%)
Gender		
Male	79	44.6
Female	98	55.4
Age		
<20	9	5.1
20-25	124	70.1
>25	44	24.9
Religious orientation		
Roman Catholic	89	50.3
Evangelical	46	26.0
Pentecostal	36	20.3
Others	6	3.4
Year of study		
300 level	21	11.9
400 level	24	13.6
500 level	110	62.1
600 level	22	12.4

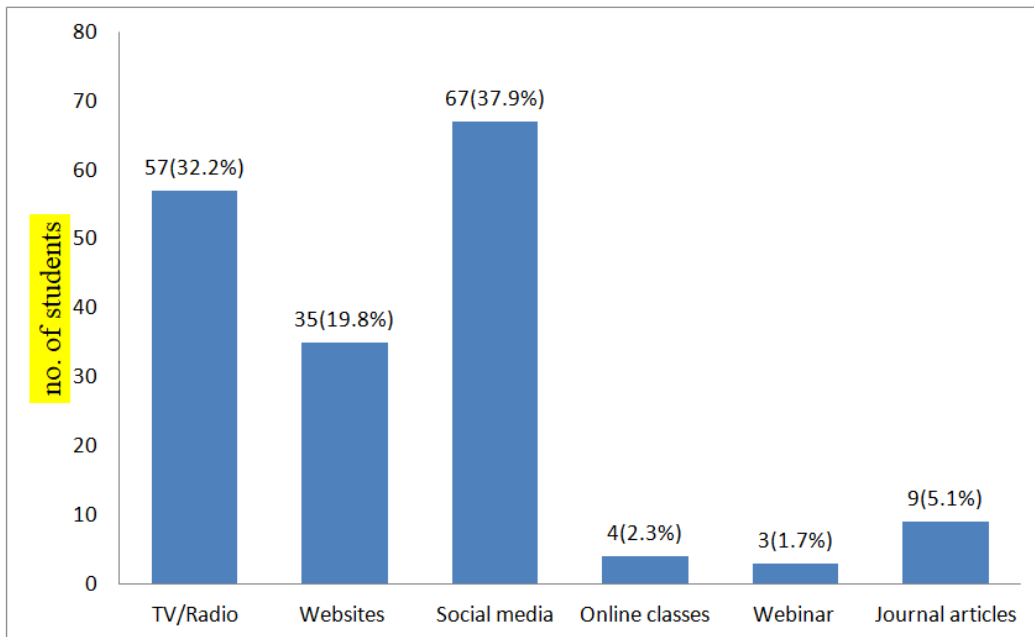


Fig. 1. Sources of information about COVID 19
Source of information

Table 2. Knowledge of COVID-19 among participants (n=177)

Variable	Response	Frequency	Percent
Virus is same as the SARS, MERS virus	Right	119	67.2
	Wrong	48	27.1
Virus highly infectious	Right	169	95.5
	Wrong	8	4.6
Virus cannot persist on surfaces for few hours	Right	86	48.6
	Wrong	39	50.3
Cannot be transmitted by infected persons with no fever	Right	166	93.8
	Wrong	10	5.7
Transmitted mainly by inhaling infected respiratory droplets	Right	157	88.7
	Wrong	18	10.2
COVID-19 is associated with low mortality in our population	Right	95	53.7
	Wrong	82	46.3
Contacts with infected person should be isolated	Right	177	100
	Wrong	0	0
Risk of contacting virus is higher in enclosed space	Right	132	74.6
	Wrong	42	23.7
Wearing PPE removes need for social distancing	Right	167	94.4
	Wrong	9	5.1
Cross usage of personal effects may lead to spread of infection	Right	141	79.7
	Wrong	34	19.2
Young adults not susceptible	Right	172	97.2
	Wrong	4	2.3
	Wrong	4	2.3
Not all person with COVID19 will develop severe cases	Right	170	96.0
	Wrong	5	2.8
Higher risk for severe cases in co-morbidities and old age increased	Right	172	97.2
	Wrong	3	1.7
Hot climate scientifically proven to be preventive	Right	75	42.4
	Wrong	100	56.4

As shown in Table 3, age ($P=.006$) and year of study ($P<.05$) have statistically significant impact on participants' knowledge of COVID-19. However, the source of information on the pandemic does not significantly impact the level of knowledge of the pandemic ($P=.266$).

Table 4 is a display of participants' willingness to participate in COVID-19 care and the impact of knowledge level on that. Most participants, 113 (63.8%) agreed that medical students should participate in the medical response to the pandemic and are willing to participate in such responses, 22 (12.4%) disagreed while 42 (23.7%) were indifferent. Also, knowledge level of the pandemic does not have statistically significant effect on participants' willingness to take part in the response to it ($P=.156$). Reasons given by participants for willingness to participate include the need to acquire skill being future members of the medical team, 100 (88.5%), to help ensure that academic programme is not

interrupted, 54 (47.8%) if participating is necessary to ensure that and desire to get a reward if there is an attached reward/compensation, 33 (29.2%). In the same vein, 69 (61.1%) respondents expressed willingness to participate in COVID-19 care out of a sense of duty especially if called upon by authorities. The reasons for unwillingness to participate in COVID-19 response include fear of contracting the infection, 20 (90.9%), need for parental approval 11(50%) and lack of PPE 16(72.7%).

A total of 103 (91.2%) students who are willing to participate in the response preferred tasks that did not require PPE namely clinical triaging of patients and research. Other preferred tasks include health education, 48 (42.5%) and contact tracing, 38 (33.6%). As shown in Table 5, age ($P=.004$) and sex ($P=.005$) have statistically significant effect on participants' choice of the type of task they are willing to take part in.

Table 3. Factors that affect knowledge of COVID-19

Variable		Poor knowledge(N = 32) n (%)	Good knowledge (N = 145) n(%)	Chi square	P-values
Sex/Gender	Male	11(34.4)	68(46.9)	1.663	.197
	Female	21(65.6)	77(53.1)		
Age in years	<20	5(15.6)	4(2.8)	9.229	.006
	20-25	23(71.9)	101(69.7)		
	>25	4(12.5)	40(27.6)		
Religious orientation	Catholic	14(43.8)	75(51.7)	2.037	.574
	Evangelical	10(31.2)	36(24.8)		
	Others	0(0)	6(4.1)		
	Pentecostal	8(25.0)	28(19.3)		
Year of study	300 level	10(31.2)	11(7.6)	16.823	<.05
	400 level	7(21.9)	17(11.7)		
	500 level	14(43.8)	96(66.2)		
	600 level	1(3)	21(14.5)		
Sources of information				7.639	.266
Journal articles	3	6			
Online courses	1	3			
Social media	16	51			
TV/Radio	6	51			
Webinar	0	3			
Websites	5	30			

Table 4. Participants' willingness to participate in the response to COVID-19 and the impact of knowledge level on that (n = 177)

Variable	Agree	Disagree	Neutral	Strongly agree	Strongly disagree	Total	Chi square	P value
Participants' willingness to participate								
Frequency	57	14	42	56	8	177		
Percent (%)	32.2	7.9	23.7	31.6	4.5	100		
Effect of knowledge level on participants' willingness to participate in COVID-19 response								
Poor knowledge, n(%)	12(37.5)	2(6.2)	8(25.0)	7(21.9)	3(9.4)	32(100)	8.001	.156
Good knowledge, n(%)	45(31.0)	12(8.3)	34(23.4)	49(33.8)	5(3.4)	145(100)		

Table 5. Relationship between socio-demographic characteristics and preferred task

Sociodemographic characteristics	Type of task		Chi square	P-value
	Assisting with non PPE requiring task, n(%)	Contact tracing, n(%)		
Level of study			22.59	.032
	N(%)	N(%)		
300L	7(33.3)	3(14.3)		
400L	16(66.7)	2(8.3)		
500L	62(56.4)	27(24.5)		
600L	15(68.2)	6(27.3)		
Religious Orientation			11.078	.522
Catholic	50(56.2)	17(19.1)		
Evangelical	24(52.2)	13(28.3)		
Pentecostal	23(63.9)	5(13.9)		
Others	3(50)	3(50)		
Age (years)			22.023	.005
<20	3(33.3)	0		
20-25	76(61.3)	22(17.7)		
>25	21(47.7)	16(36.4)		
Sex			15.517	.004
Female	55(56.1)	13(13.3)		
Male	45(57)	25(31.6)		

4. DISCUSSION

Medical students' training is peculiar compared to other undergraduates. This peculiarity became further highlighted by the COVID-19 pandemic. Normally medical education requires that medical students make contacts with patients as means by which they are taught. In the COVID-19 era, if their training must continue in its original form, they shall necessarily make some degree of contact with COVID-19 infected individuals where such person(s) present for care. Also, medical students in the course of their daily activities come across a lot of other individuals in and outside the hospital settings. As a result, an infected medical student could be a source of infection to so many. On the other hand, a healthy medical student with the right knowledge could be a resource person for the much needed human resource for health in pandemic period. He could be useful in areas like health enlightenment campaigns, patient triage in the hospitals and as a source of positive influence for attitudinal change in line with COVID-19 preventive measures among others. At the time of this study neither a definitive treatment guideline nor an effective vaccine had been developed hence prevention was the most viable tool for containing the spread of the virus. Hence the only protection against the virus was non-pharmacological measures.

Majority of our respondents were aged 20-25 years similar to the report from other studies [16,

17]. However, though females were in the majority in our study, Mohammed et al reported majority of males [16]. This study revealed high knowledge level with respect to COVID 19 among the respondents and this is similar to the findings by Khali et al in Iraq [18], as well as the findings by Noreen et al in Pakistan [19]. This may become useful because since these medical students come from families and communities and therefore have the capacity and opportunity to take the right message concerning COVID-19 to the grass roots.

Majority of the students were aware that COVID - 19 is highly infectious and that transmission is mainly by inhaling infected respiratory droplets. This is similar to the finding in other studies involving medical undergraduates [18,19]. The study revealed also that all the respondents were in agreement that persons who had contact with an infected individual should be isolated. Similarly Khalil et al also reported that majority of their respondents would accept isolation in health facility if infected by COVID – 19 [18]. Majority were also aware that individuals with co-morbidities and those who are advanced in age are at increased risk of severe disease and death and this is in agreement with the report by other researchers [20].

However a number of misconceptions among the respondents were also revealed by the study. Surprisingly, a good number of the respondents believed that the virus cannot persist for a few

hours on surfaces. Over ninety percent of the respondents believed that infected individuals who do not have fever cannot transmit the virus to other individuals. Well over half of the respondents believed that the risk of contracting the virus is similar both in open and enclosed spaces. Also up to ninety seven percent of the respondents believed that young people are not susceptible to COVID – 19 infection while a little less than half of the respondents believed that it is scientifically proven that hot climate is preventive against the virus. Similarly, researchers from other centers have documented various misconceptions though of different kinds about the pandemic among their population. For example a study in Mizan, Ethiopia reported that 40% of their respondents believed that ingestion of antibiotics can cure COVID – 19 [21]. Also Noreen et al [19] reported that half of their respondents did not believe that the risk of getting infected with COVID-19 was higher when travelling by plane. They also reported that 39% of the respondents thought that the virus was made by man and deliberately released into the human community. Such level of misconceptions as revealed by our study may be because the study was carried out at relatively early stages of the pandemic when verified information about COVID-19 was scanty. Also the respondents in our study were at home during the time of the study and as the study revealed majority of the respondents sourced their information about COVID – 19 from social media where inaccurate information thrive a lot. All the same these misconceptions represent a significant knowledge gap which calls for increased effort at dissemination of appropriate information.

Of all the socio-demographic variables only age ($P < .05$) and year of study ($P < .05$) were noted to significantly affect the level of knowledge of the respondents about COVID -19 with older students and those in higher classes demonstrating higher level of knowledge about COVID - 19. This appears to follow the reasoning that as people get older, they tend to analyze issues more critically and would be more disposed towards taking responsibility for their decisions and actions. Also, students in higher classes were more likely to have more and accurate knowledge about COVID-19 most likely for having had longer exposure to medical training and information.

Our study showed source of information about the pandemic did not significantly affect the

participants' knowledge level of the pandemic ($P=.266$). The highest proportion of the respondents reported social media as their source of knowledge about COVID -19. This is similar to report by other workers [18] but different from findings by Noreen et al [19] who noted that highest proportion of the respondents sourced information about COVID – 19 from television. Varying socioeconomic class and varying local environmental factors may have accounted for these differences since it is the facility you have at your disposal that will determine the ones through which you will get information. From our study, the next most common source of knowledge about the virus as reported by the respondents was radio. On another hand, webinar and online classes were identified by the respondents as the least source of information about the virus. It can be inferred from this that information about COVID-19 targeted at young people should be disseminated through the social media.

Also findings from this study showed that majority of the respondents were willing to participate in COVID-19 preventive measures. This is similar to the findings from other studies [16,17,22] but contrasts with the position of American Association of Medical Colleges that insist that medical students should not participate in the response efforts against the virus[23]. Majority of the respondents agreed that medical students should be part of COVID-19 management as that will help them acquire relevant skills since they are future members of the health team. Worthy of note is that though a greater proportion of those willing to participate in COVID-19 management were very knowledgeable about the pandemic, the effect of knowledge on willingness to participate was not statistically significant ($P = .156$). This may be because our general public views government with significant distrust and since government was the major driver of the efforts against COVID-19, the people's response to the pandemic based on gut feeling rather than what they learn from government. Another possible explanation is that the reasons for willingness to participate are mostly "self-serving" so that respondents' willingness to participate will be based on the need for self-preservation than based on knowledge. This suggests that there may be other factors than knowledge that influence this behavior. Another research may therefore be necessary to study them. However willingness to participate in COVID-19 management was noted to be significantly

affected by year of study ($P=.032$), age ($P = .005$) and gender ($P = .004$). Again this appears to be in line with the reasoning that the higher the year of study the more medical training would have impacted on individual's ability to analyze situations as well as their capacity and willingness to accept responsibilities. Also it is believed that as one becomes older, they become more likely to develop the capacity to analyze situations better and also to take on responsibilities. Similarly that gender significantly affect willingness to participate with males being more willing to participate appears to be in line with the empirical observation that males were generally more daring than the females. Our finding that males are more willing than females contrasts with findings from other studies [24,25]. The implication of these findings for practice is that should there arise the need to recruit medical students to participate in COVID-19 response there should be stratification of the students in each of the variable that shows statistically significant relationship with willingness to participate. The types of tasks our respondents were willing to participate in are similar to findings from other studies [22,24,26]. Similarly the reasons for willingness and for unwillingness to participate are also similar to those given by participants in other studies [22,24,26].

This study had some limitations. The online mode of administering the questionnaire may have affected the response seeing that internet access is not freely available in our country. Also a larger proportion of the respondents belong to the 500 level meaning that the findings may not be generalized to all clinical level students.

4.1 Important Implications of Findings from this Work

1. Social should be used as a major source of passing the information about the COVID-19 pandemic to medical students and possibly youths generally.
2. The possible availability of other variables that affect willingness to participate in COVID-19 suggests that the true measure of clinical-level medical students' willingness to participate in COVID-19 response is fully known and that another research may be necessary to study that.
3. There is need for improved supply of PPE as this will enhance the medical students' willingness to participate in the response to the pandemic.

4. Government and policy makers need to create an environment that can foster trust in medical students and possibly youths generally.

5. CONCLUSION

Medical students in our center are knowledgeable in COVID-19 pandemic and are willing to participate in response to the pandemic especially if suitable environment including adequate PPE is provided. There may likely be ethical issues around their participation that may need to be explored before such participation. The knowledge of clinical-level medical students in our university does not significantly affect their willingness to participate in the medical response to COVID-19, though most participants agree or strongly agree that they are willing to participate. This suggests the need for another research to explore other possible factors than knowledge that may be affecting students' willingness to participate in COVID-19 care. There is need for deliberate effort at training medical students about the COVID-19 pandemic in order to prepare them for possible role in the management of the present and possible future pandemics. There is also the need for adequate provision of optimal environment and adequate PPE as a way to encourage willingness to volunteer in students.

CONSENT AND ETHICAL APPROVAL

Ethical clearance with number ESUTHP/C-MAC/RA/034/VOL.2/65 was obtained from the Health and Research Ethics Committee of the teaching hospital. Informed consent was obtained from each participant and they were assured of their confidentiality.

ACKNOWLEDGEMENT

The authors acknowledge Dr. Awoere Chinawa who helped with the data analysis. The authors declare that they received no form of funding for this research.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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