



Impact of the COVID-19 Pandemic on Surgical Residency Training: Perspective from a Low-Middle Income Country

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Abstract

Background The COVID-19 pandemic has drastically impacted postgraduate training programmes worldwide. This study aims to evaluate the Nigerian situation with respect to surgical training, with a view to identifying gaps and proffering solutions.

Methods A cross-sectional survey of surgical residents in Nigeria was conducted between 27 July 2020 and 14 August 2020. A structured questionnaire designed using the free software Google Forms[®] was utilised for the study. The questionnaire was electronically distributed randomly to 250 surgical residents via emails and social media platforms including WhatsApp and Telegram. The data obtained was analysed by Google Forms[®]. Ethical approval for the study was obtained from the ethics and research unit of the Obafemi Awolowo University Teaching Hospitals Complex (OAUTHC), Ile-Ife, Osun State, Nigeria.

Results At the end of the study period, 207 surgical residents completed and submitted the questionnaire, giving a response rate of 82.8%. The majority of respondents reported a reduction (164, 79.2%) or cancellation (11, 5.3%) of postgraduate programmes in their institutions. Of those who had academic programmes, meetings were done using virtual technology in all instances. The majority of respondents reported seeing fewer patients in the outpatient clinics (173, 83.6%), as well as a reduction in the number of emergency and elective operations (58.5% and 90.8%, respectively). About a third of the respondents (70, 33.8%) were contemplating emigrating from the country.

Conclusion The COVID-19 pandemic has significantly affected the clinical, research and teaching components of surgical training in Nigeria. It has, however, led to increased adoption of digital technology which should be further explored in the face of current realities.

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Introduction

In late December 2019, the coronavirus disease-2019 (COVID-19), caused by a novel severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), emerged in Wuhan, China [1]. By 30 January 2020, when the World Health Organisation (WHO) announced COVID-19 as the sixth Public Health Emergency of International Concern, it had spread to over 20 countries worldwide (including the United States of America) [2]. The WHO declared the disease a pandemic on 11 March 2020, having affected over 100 countries, with more than 100,000 recorded infections [3, 4]. To date, over 23 million cases and more than 800,000 deaths have been reported in 215 countries worldwide [5]. All African countries are affected, with a total case count of over 1 million and more than 27,000 deaths, representing 5% of all cases reported globally [5]. Since the first case of COVID-19 in sub-Saharan Africa was reported in Nigeria on 27 February 2020, the country has recorded 53,477 cases and 1011 deaths in all her 36 states, including the Federal Capital Territory (FCT), as at 28 August 2020 [6, 7]. Over 850 Nigerian health workers have been infected with the virus [8]. More than 300 of these are resident doctors, sadly, 14 have died from the infection [8]. The foregoing gives a peek into the public health impact of the COVID-19 pandemic.

In line with international measures, the Nigerian government declared a total lockdown on 30 March 2020 [9]. Although the total lockdown was eased on 27 April 2020 to allow for minimal essential activities, containment measures such as curfews, restricted work hours and restriction of physical/social gatherings continued until 3 September 2020, when the second phase of the relaxed lockdown was reviewed, and the third phase which began on 4 September 2020, was declared [10, 11]. These measures have impacted negatively on patient care, especially so with the suspension of outpatient clinics and postponement of elective operations across most surgical specialties [10]. Patients are also generally reluctant to visit hospitals due to fear of contracting the virus [12]. Studies evaluating the implications of these on patient outcomes during the pandemic have shown a significant rise in mortality and morbidity [13, 14].

The pandemic and its containment measures also have important ramifications on the training of medical doctors [15]. The surgical specialties, being largely dependent on patient flow for hands-on experience, stand the greatest risk of being negatively affected. The impact of the coronavirus pandemic on the training of residents in surgical specialties in Nigeria was therefore evaluated in this study.

Methodology

A cross-sectional survey of resident doctors in surgical specialties (including general surgery, obstetrics and gynaecology, orthopaedic surgery, neurosurgery, ear, nose and throat surgery, maxillofacial surgery, urology, cardiothoracic surgery, ophthalmology, plastic surgery and paediatric surgery) in Nigeria was conducted between 27 July 2020 and 14 August 2020, during the partial lockdown. A 42-item study-specific electronic questionnaire designed using the free software Google Forms[®] was utilised for the study. The questionnaire gathered information on demographic characteristics, impact of the pandemic on training activities, research and service delivery, mode of training activities during the ongoing pandemic, impact of the pandemic on emigration of doctors, career progression, as well as psychological impact of the pandemic on surgical residents. The majority of the items were multiple-choice questions while few, such as those requesting for the number of cases done were open-ended.

The questionnaire was randomly distributed electronically to 250 surgical residents via emails (15), WhatsApp (198) and Telegram (37). Reminders were sent to non-responders a week after. To optimize survey integrity, the online survey platform was structured to permit only one response per time. Clicking on the agree button and submitting the survey responses implied consent to participate in the study. Participation was voluntary, and no incentives were offered. Collected data were analysed using Google Forms[®].

Ethical approval for the study was obtained from the ethics and research unit of the Obafemi Awolowo University Teaching Hospitals Complex (OAUTHC), Ile-Ife, Osun State, Nigeria.

Results

Sociodemographic characteristics of respondents

At the end of the study period, 207 surgical residents in 23 training institutions (private, state and federal teaching

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hospitals and medical centre) across the six geopolitical zones of the country completed and submitted the questionnaire, giving a response rate of 82.8%. Of the 207 respondents, the majority were males, 181 (87.4%), in the fourth decade of life, 160 (77.3%). The respondents were spread across 11 surgical subspecialties. General surgery and obstetrics and gynaecology residents constituted the highest number, 50 (24.2%), each. A significant number of respondents were senior registrars, 114 (55.1%), in their fifth year of residency training, 44 (21.3%), as shown in Table 1.

Table 1 Sociodemographic characteristics of respondents

Characteristics	Frequency, <i>n</i> = 207	Percentage (%)
<i>Sex</i>		
Male	181	87.4
Female	26	12.6
<i>Age (years)</i>		
20–29	9	4.3
30–39	160	77.3
≥ 40	38	18.4
<i>Specialty</i>		
General surgery	50	24.2
Obstetrics and gynaecology	50	24.2
Orthopaedic surgery	32	15.5
Neurosurgery	15	7.2
Ear, nose and throat surgery	14	6.8
Maxillofacial surgery	10	4.8
Urology	10	4.8
Cardiothoracic surgery	8	3.9
Ophthalmology	8	3.9
Paediatric surgery	6	2.9
Plastic surgery	4	1.9
<i>Cadre</i>		
Registrar	93	44.9
Senior registrar	114	55.1
<i>Residency year</i>		
First	29	14.0
Second	33	15.9
Third	23	11.1
Fourth	30	14.5
Fifth	44	21.3
Sixth	16	7.7
≥ Seventh	32	15.5
Total	207	100

Impact on pattern of academic programmes

The majority of respondents reported a reduction (164, 79.2%) or cancellation (11, 5.3%) of postgraduate programmes in their institutions. Of those who had academic programmes (183, 88.4%), meetings were virtual in all instances, with Zoom[®] being the platform used in the overwhelming majority of cases (189, 91.3%). Academic seminars (172, 83.1%) and journal club meetings (66, 31.9%) were the most common virtual academic programmes reported, while few had virtual surgical simulations (6, 2.9%) and telesurgery (3, 1.4%). The majority of respondents (119, 57.5%) preferred the online platform to physical meetings, and wanted training/academic programmes to continue virtually beyond the pandemic. These findings are depicted in Table 2.

Table 2 Impact of COVID-19 on pattern of academic programmes

Characteristics	Frequency, <i>n</i> = 207	Percentage (%)
<i>Frequency of didactic teachings</i>		
Increase	14	6.8
Decrease	164	79.2
No Change	18	8.7
None	11	5.3
<i>Virtual training programmes</i>		
Yes	183	88.4
No	24	11.6
<i>Type of virtual training programme</i>		
Academic seminars	172	83.1
Journal clubs	66	31.9
Grand rounds	65	31.4
Teaching rounds	33	15.9
Surgical simulation	6	2.9
Telesurgery	3	1.4
<i>Virtual platforms utilized</i>		
Zoom [®]	189	91.3
GoToWebinar [®]	5	2.4
Google Classroom [®]	5	2.4
GoToMeeting [®]	4	1.9
Cisco Webex [®]	1	0.5
Google Meet [®]	1	0.5
WhatsApp [®]	1	0.5
<i>Should virtual training programmes continue beyond the pandemic?</i>		
Yes	119	57.5
No	88	42.5
Total	207	100

Table 3 Impact of COVID-19 on clinical experience and activities

Characteristic	Frequency, n = 207	Percentage (%)
<i>Outpatient consultations</i>		
Increase	5	2.4
Decrease	173	83.6
No change	29	14.0
<i>Emergency cases</i>		
Increase	12	5.8
Decrease	146	70.5
No change	49	23.7
<i>Emergency surgeries</i>		
Increase	13	6.3
Decrease	121	58.5
No change	73	35.3
<i>Emergency surgery attendance</i>		
Increase	13	6.3
Decrease	138	66.7
No change	56	27.1
<i>Elective surgeries</i>		
Increase	3	1.4
Decrease	188	90.8
No change	16	7.7
<i>Elective surgery attendance</i>		
Increase	6	2.9
Decrease	178	86.0
No change	23	11.1
Total	207	100

Impact on clinical experience and activities

The majority of respondents, 173 (83.6%), reported seeing fewer patients in the outpatient clinics since the pandemic began. More than two-thirds, 146 (70.5%), attended to less emergency cases, and more than one-half, 121 (58.5%), reported a reduction in the number of emergency operations in their units. 188 (90.8%) respondents concluded their units were doing fewer elective operations in the COVID-19 era. These findings are illustrated in Table 3.

Impact on career and career progression

Overall, 170 (82.1%) residents believed the pandemic had a negative impact on their training and professional growth. The pandemic had elongated the duration of training/time of completion of residency training of more than one-half, 123 (59.4%), of the respondents. The pandemic had also disrupted the progress of the

Table 4 Impact of COVID-19 on the career and career progression of surgical residents

Characteristics	Frequency, n = 207	Percentage (%)
<i>Overall impact on residency training</i>		
Positive	37	17.9
Negative	170	82.1
<i>Elongation of residency completion</i>		
Yes	123	59.4
No	84	40.6
<i>Stage of dissertation</i>		
Still writing proposal	42	36.8
Submitted dissertation proposal	14	12.3
Sample collection	26	22.8
Completed and submitted dissertation	12	10.5
Others	20	17.6
<i>Personal study time</i>		
More	138	66.7
Less	24	11.6
No response	45	21.7
<i>Missed any conference/update course?</i>		
Yes	89	43.0
No	118	57.0
Total	207	100

dissertations, a requirement for the fellowship examinations of the postgraduate surgical colleges, of 73 (64.0%) senior registrars. Only 12 (10.5%) senior registrars had completed and submitted their dissertations to the postgraduate surgical colleges.

The majority of respondents reported they had more time for personal study 138 (66.7%) during the pandemic. More than one-half, 118 (57%), had not missed any conference or update course during the pandemic. These findings are shown in Table 4.

Impact on physical and psychological wellbeing

The majority of the respondents, 173 (83.6%), reported they did not have appropriate/adequate personal protective equipment (PPE) to work with. Increased stress and anxiety levels were reported by more than one-half of the respondents, 121 (58.5%). More than three-fourths of the respondents, 183 (88.4%), feared they may contract the coronavirus at work, while 187 (90.3%) feared they could transmit the virus to their family members. The fear of contracting

Table 5 Impact on physical and psychological wellbeing

Characteristic	Frequency, <i>n</i> = 207	Percentage (%)
<i>Availability of adequate/appropriate PPE to work with</i>		
Yes	34	16.4
No	173	83.6
<i>Stress/anxiety levels</i>		
Increase	121	58.5
Decrease	31	15.0
No change	55	26.6
<i>Fear of contracting the virus at work?</i>		
Yes	183	88.4
No	24	11.6
<i>Fear of transmitting the virus to family members?</i>		
Yes	187	90.3
No	20	9.7
<i>Has the fear of contracting the virus affected proper patient evaluation?</i>		
Yes	133	64.3
No	74	35.7
Total	207	100

COVID-19 had affected proper evaluation of patients by 133 (64.3%) respondents. These are shown in Table 5.

Impact on emigration

About a third of the respondents, 70 (33.8%), had considered migrating out of the country during the pandemic. Of these, 11 (15.7%), believed it was easier to do so now, as many foreign countries are currently in need of more medical personnel to cope with the pandemic.

Discussion

The direct public health impact of the COVID-19 pandemic is known to all, but the more subtle ramifications of this unprecedented global disaster are yet to be fully unraveled. One of such is the impact on postgraduate training, particularly in the surgical specialties which currently lack adequate number of personnel across virtually all specialties [16, 17]. Our survey showed that all aspects of surgical training were affected by the pandemic with increasing delays in training periods, increased psychosocial stress and a potential to worsen the already existing challenge of brain drain.

Disease containment measures like lockdowns and social distancing have necessitated the postponement/cancellation of outpatient clinics and elective operations [10]. Limiting elective clinical activities protects patients from

in-hospital viral transmission, preserves PPE to be prioritized for the care of patients with COVID-19, and makes ward and critical care beds available for upsurges in the numbers of COVID-19 cases [18]. The American College of Surgeons and the Royal College of Surgeons of England both recommend that non-emergency procedures be postponed or delayed, except cancer-related operations [19, 20]. Local and regional bodies such as the Society of Gynaecology and Obstetrics of Nigeria (SOGON) also recommend telephone consultations for non-emergency cases, and reorganization of duty rosters to prevent patients visiting the hospital unnecessarily and to limit hospital contact of medical personnel [21]. Expectedly therefore, the majority of respondents in our study reported a reduction or cancellation of postgraduate programmes in their institutions. Most of them also reported seeing fewer patients in the outpatient clinics, as well as a reduction in the number of and attendance at emergency and elective operations. These findings are similar to the findings of other authors [15, 22–24]. These findings have potential significant negative impact on surgical training vis-à-vis acquisition of surgical skills and expertise, which are greatly dependent on hands-on experience.

The postponement of clinical activities would also affect the career progression of surgical residents. This fact was alluded to by more than three quarters (170, 82.1%) of the respondents in our study. It is evident that for the 2019/2020 training year, most surgical residents will not be able to complete their clinical rotations, operative log books, or have the prerequisite exposures required for programme accreditation [23] and qualification for the membership and fellowship examinations of the postgraduate surgical colleges. Our study revealed that the pandemic had elongated the duration of training/time of completion of residency training of more than one-half (123, 59.4%) of the respondents. Only 12, 10.5%, senior registrars in our study had completed and submitted their dissertations, a prerequisite for the fellowship examinations, to the postgraduate surgical colleges.

The health and well-being of surgical residents in the country have also been negatively affected by the pandemic. Over 900 Nigerian doctors (including surgical residents) have been quarantined following exposure to the virus, with more than 300 of them testing positive for COVID-19 [8, 10]. Sadly, 14 Nigerian doctors have died of COVID-19, the first, an obstetrician, following a Caesarean section [25]. Shortage of PPE is a major contributing factor to these infections and deaths [15]. Most (173, 83.6%) of the respondents in our study did not have appropriate/adequate PPE to work with. Though the Nigerian government has recently ramped up efforts in increasing the supply of PPE to public hospitals across the country, these are still grossly inadequate [10].

The mental health/psychological impact of the COVID-19 pandemic has been linked to various stressors including but not limited to the paucity of testing and treatment resources, protective equipment for healthcare providers, disease containment measures (like compulsory use of face masks, lockdowns and social distancing) that tend to infringe on personal freedoms and economic losses resulting from the pandemic [26]. Our study found increased stress and anxiety levels in more than one-half (121, 58.5%) of the respondents. The fear of contracting the virus at work and transmitting same to family members, as well as the non-availability of appropriate/adequate PPE were the implicated stressors.

On a positive note, most of the respondents reported that they had more time for personal study (138, 66.7%) during pandemic. This is not unexpected following the down-scaling of clinical and surgical activities. Also, more than one-half (118, 57%) of the respondents had not missed any conference or update course during the pandemic, as the postgraduate colleges are now conducting these virtually. An overwhelming majority of the respondents, 188, 88.4%, also reported that training/academic programmes in their institutions were currently being conducted virtually. It is recommended that training programmes should invest in virtual and digital platforms for the education and training of trainees [27, 28]. Simulations or hands-on technical skills training are difficult to conduct virtually though [27]. This was corroborated by findings in our study, as academic seminars and journal club meetings were the most common virtual programmes reported (172, 83.1% and 66, 31.9%, respectively). Only a few respondents reported virtual surgical simulations and telesurgery (6, 2.9% and 3, 1.4%, respectively). Zoom[®] was the predominant virtual meeting platform utilized (189, 91.3%). Archibald et al. reported that Zoom[®], an innovative videoconferencing platform, was generally rated above alternative videoconferencing platforms [29]. It is instructive to note that the majority (119, 57.5%) of respondents preferred online to physical meetings for training programmes, and want these programmes to continue virtually beyond the pandemic. This may not be unconnected with the convenience of attending virtual meetings, as well as better attendance by both trainees and trainers. A drawback though, is the generally poor mobile network and internet connectivity, as well as expensive data subscriptions in Nigeria.

It is interesting to note that despite Europe and America being worse hit by the pandemic, about one-third of respondents (70, 33.8%) contemplated migrating to these countries, defying the odds. In a country with a depleted workforce, one third of her potential workforce emigrating to other countries at a time when more workforce is required has the potential of worsening the already existing global healthcare inequalities. The massive emigration of

Nigerian health professionals therefore deserves critical attention in order to avoid a looming health care crisis in the country.

The high response rate (82.8%), a strength of this study, may have been the result of the use of multiple channels (emails, WhatsApp and Telegram) for administering the questionnaire. This study was conducted about four months after containment measures had been in effect. This was sufficient time for respondents to have observed the changes which were reported in the study. Furthermore, given that containment measures were still in place at the time of administering the questionnaire, the observations made by the respondents were a reflection of the true situation to a reasonable extent, and reduces the possibility of recall bias.

This study, though limited by its descriptive nature, provides important data upon which interventions can be planned.

Conclusion

The COVID-19 pandemic has significantly impacted the surgery residency training programme in Nigeria. Surgical residents currently see less patients in the outpatient clinics and attend fewer emergencies and elective operations. These findings have far-reaching negative implications for training, as surgical specialties are largely dependent on patient flow for hands-on experience. The pandemic has also disrupted the career progress of residents and prolonged the duration of training for the majority. Though many academic programmes are now conducted virtually, there are other aspects of training such as ward rounds and theatre sessions for which, there is limited technology to transmit. These and other areas need to be further explored to keep pace with the demands of this period.

Recommendations

There is need to invest in virtual and digital technologies for the education and training of surgical residents. Ward rounds/bedside didactic teachings (with few residents on ground, in line with social distancing measures), can be conducted with body cameras that would record and transmit same to external video units, allowing other residents watch/observe these sessions. Teleconsultations/medicine/surgeries should be encouraged and developed, as these would not only reduce unnecessary hospital visits by patients, in line with the disease containment measures, but also promote international collaboration, learning and research. In this regard, the mobile phone networks and internet service providers would do well to facilitate the

use of telemedicine for outpatient consultations, as well as digital platforms for education, learning and training by their subscribers. The postgraduate surgical colleges should sustain the virtual conduct of update courses, conferences and online submissions of case books and dissertations.

The government should increase the supply of, and ensure the availability of appropriate PPE in public hospitals in the country. This would significantly reduce the psychological burden of the disease on healthcare personnel, worsened by the fear of contracting the virus during patient care.

It will be interesting to re-evaluate in the near future, the impact of some of the recently adopted innovations occasioned by the pandemic on surgical residency training. Furthermore, the feasibility and effectiveness in a resource limited setting, of some of the more sophisticated technological innovations earlier proposed, are also important areas that could be explored.

Compliance with ethical standards

Conflict of interest The authors declare that they have no conflict of interest.

Informed consent Informed consent was obtained from all individual participants included in the study.

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