

# Postgraduate Neurosurgical Education in the Current COVID-19 Climate: An Auspicious Time for a Paradigm Shift in Africa

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## Abstract

Neurosurgical education is undergoing serious challenges in the present climate of the COVID-19 pandemic, especially in Africa and other developing countries where the Halstedian style of medical education and training remains persistent due to a lack of infrastructural innovations and resources. Therefore, to ensure the continuity of training and services with guaranteed safety of the neurosurgical staff and patients, there is a need for a pedagogical change of the training and educational model with the incorporation of neurosurgical simulation laboratory training and online/virtual neurosurgical education.

**Keywords:** Africa, education, neurosurgery

## INTRODUCTION

Clinical education is uniquely different from education in other disciplines at both undergraduate and postgraduate levels because of the fundamental relationship between clinical work and clinical science education, in which education takes place in the workplace and both are complimentary. Therefore, the pedagogy used in nonclinical disciplines cannot be realistic in the clinical sciences, especially the neurosurgical specialty, with its requirements for complex technical skills. In the past centuries, surgeons have been taught through the Halstedian model of training that entails learning the techniques of surgery through apprenticeship.<sup>[1]</sup> This method was quite successful in providing a skilled surgical workforce in the past.<sup>[2]</sup> In recent times, before the emergence of the coronavirus disease pandemic in late 2019, many neurosurgical training institutions, especially in developed countries, have incorporated surgical skill simulation laboratories into the training of neurosurgeons to overcome the lack of adequate exposure of their trainees and young neurosurgeons. This serves to supplement the limited volume of patients and minimize potential risks to patients from inexperienced trainees.<sup>[3]</sup> The current climate of the coronavirus disease pandemic, with the compelling need for social distancing, cancellation of large gatherings including surgical conferences, and suspension of medical school programs, has led to universal institutional adjustments

in many health institutions around the world, thereby redefining the scope and mode of surgical education with a need to supplement an existing Halstedian (apprenticeship) training model with nonHalstedian models that include neurosurgical skills simulation courses and online/virtual neurosurgical education.<sup>[4,5]</sup> There is, therefore, the obvious need to increase the involvement of the nonHalstedian models in the neurosurgical training in Nigeria, and Africa at large, for effective training of neurosurgical trainees, as is being done in some developed countries.<sup>[3]</sup>

## CHALLENGES WITH NEUROSURGICAL EDUCATION AND TRAINING IN DEVELOPING COUNTRIES IN THE FACE OF COVID-19

The novel coronavirus emerged at the end of 2019 in Wuhan, a business hub of China, with the infection of over seventy

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thousand people and the death of more than one thousand, eight hundred people within the first fifty days of the epidemic.<sup>[6]</sup> The Chinese research authorities isolated this new virus from a seafood market in Wuhan city on January 7, 2020, and with the spread of the virus came deleterious effects on China's economy.<sup>[7,8]</sup> As China is a major exporter of commodities to African countries, the contraction of China's economy expectantly resulted in negative consequences for the economies of African countries.<sup>[7]</sup> Health-care expenses in most African countries are made out of pocket, therefore, despite the quarantine, lockdown, and other measures adopted to stop the spread of COVID-19 in African countries, the number of infected cases continued to rise, leading to the mobilization of scarce health-care resources toward the care of coronavirus disease patients.<sup>[7,9]</sup> This mobilization of the scarce healthcare resources is inclusive of intensive care unit facilities such as mechanical ventilators, with potential consequences for cancellations of elective surgical cases, and neurosurgical procedures are no exception.<sup>[10,11]</sup>

In our experience, many patients with non-coronavirus diseases have become scared of seeking health care due to fear of infection by the coronavirus because hospitals are now seen as the epicenter of COVID-19. These worries of patients were observed to deplete surgical operation volume and by extension, negatively affect the training of residents and students. Many surgeons currently work in a tense atmosphere with a high index of suspicion for the coronavirus disease. This invariably leads to patients' selection to ensure the safety of the surgical team, but this could be perceived as discriminatory by some undiscerning minds.<sup>[9,12]</sup>

In many institutions, there have been concerns about an inadequate supply of personal protective equipment, with many canceling surgical education programs and reducing surgical operative volume.<sup>[9,12]</sup> The Association of American Medical Colleges recommended a suspension of student-patient contact and many surgical scientific and educational programs in American institutions were canceled for safety reasons.<sup>[5]</sup> The annual scientific conference of the American Association of Neurological Surgeons slated for April 25–29, 2020 was canceled to guarantee the safety and well-being of the attendees, faculty, speakers, exhibitors, and staff.<sup>[13]</sup> Neurosurgical trainee assessment and certification examinations, such as the American Board of Neurological Surgery primary and oral examinations, and the fellowship examinations of the National Postgraduate Medical College of Nigeria and the West African College of Surgeons were canceled.<sup>[5,14,15]</sup>

## WAYS FORWARD

With the current realities of neurosurgical practice in the face of the COVID-19 pandemic, there is a need for a pedagogical review of neurosurgical training and education from the core Halstedian (apprenticeship) model to a nonHalstedian pedagogical model that involves the incorporation of surgical

simulation (for both technical and non-technical skills) and online/virtual learning programs, to fit into the current realities and reduce health risks to the surgeons, trainees, and patients.

## SURGICAL SIMULATION

Surgical simulation becomes paramount in the acquisition of the technical and nontechnical skills needed for the modern practice of surgery. Therefore, it is suggested that procedure-based skills, communication, leadership, and team working can be learned via simulation.<sup>[16]</sup> This surgical simulation-based learning has the potential to be used as a mode of assessment of an independent practitioner in the future.<sup>[16,17]</sup>

### Simulation for technical skills

The acquisition of technical skills in surgery is gradually moving from the operating rooms toward the surgical skill laboratories for new and inexperienced trainees through the process of simulation. This idea of surgical simulation is not new in surgical subspecialties; hitherto, it has been well harnessed in urology and general surgery, especially for endoscopic and robotic surgeries.<sup>[2]</sup> With the current realities of the coronavirus disease pandemic, it needs to become a pivotal instrument to be adopted in neurosurgical training because of the relatively higher risks from the long operative time associated with some procedures. There is, therefore, a very urgent need for relevant authorities to invest in this regard. Unlike in the past, when simulation skill laboratories were set up solely to ensure patients' safety without compromising skill-based learning of trainees.<sup>[2]</sup> In the current COVID-19 climate, they will also confer the advantage of safety to the surgeons and the trainees.

### Simulation for nontechnical skills

The health-care system is increasingly recognizing and focusing on the issues of safe practice and patient safety. Nontechnical skills have been defined in the health-care setting as a set of social (communication and teamwork) and cognitive (analytical and personal behavior) skills that support high quality, safe, effective, and efficient interprofessional care within the complex health-care system.<sup>[18]</sup> More recent studies have proposed the conceptual and theoretical frameworks that influence nontechnical skill learning. One of such models described three areas that facilitate learning of nontechnical skills to enhance safety in healthcare: Core knowledge and skills, which contribute to and support non-technical skill learning; situated cognition, being the approach to learning that develops these skills; and analytical skills, which integrate these elements to inform decision-making.<sup>[19]</sup>

## ONLINE/VIRTUAL DISTANCE LEARNING

Distance learning has a long history with several types available today: correspondence courses, which are conducted via regular emails with little interaction; telecourses, in which contents are delivered via radio or television broadcast;

CD-ROM courses, in which the students interact with static computer content; online learning, where Internet-based courses are offered synchronously or asynchronously; and mobile learning that is conducted through devices such as cellular phones and digital audio players (iPods and MP3 players).<sup>[20]</sup> The majority of academic leaders believe that online learning is already becoming more often used compared to face-to-face or campus-based learning and within the past decade, it has resulted in a tremendous impact on tertiary education.<sup>[20,21]</sup> Due to the availability of broadband Internet and improvement in the computing technologies, the number of people interacting via the online medium is becoming more by utilizing the various communication techniques including voice and videoconferencing; and some interact using computer-generated environments known as virtual worlds.<sup>[20]</sup> Multiple users can gain access to virtual worlds in which they appear as avatars, which are digital self-representations. This platform is able to convey audiovisual information and an interactive three-dimensional environment to the users. This would allow new and innovative techniques to be used to engage and educate a large number of health-care service providers.<sup>[22]</sup>

The need for online/virtual surgical education and training has become very obvious in the current global situation. Institutions in the USA reflected on this opportunity to embrace technological advances in web-based learning and simulation.<sup>[5]</sup> At Johns Hopkins Hospital Neurosurgery Department, grand rounds have been held using online videoconferencing services (Zoom Video Communications, Inc., San Jose, California, USA) since March 19, 2020; and since March 24, 2020, videoconferencing tools have been employed to conduct educational meetings. They include presentation sessions, case conferences, and journal clubs, and are attended by faculty, residents, fellows, and medical students.<sup>[23]</sup>

### Twitter communication

Twitter is a microblogging platform founded in 2006 with a reported 321 million active monthly users as at the end of 2018. Physicians do interact via Twitter and there is currently a Twitter-based journal club that is a virtual incarnation of the traditional in-person journal clubs.<sup>[24]</sup> This can be deployed in surgical education, especially during this coronavirus disease pandemic.

### CONCLUSION

The COVID-19 pandemic has indeed brought a lot of challenges in neurosurgical practice and training. Leveraging on simulation for both technical and nontechnical skills and online/virtual distance learning in African countries would go a long way in ensuring our trainees are adequately equipped with the necessary skills for life after training.

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### Conflicts of interest

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