Cardiovascular Topics

Impact of the COVID-19 pandemic on cardiology fellowship training in a sub-Saharan African training centre: an African perspective

E Amendezo, M Ngunga, AH Ahmed, MH Varwani, B Karau, R Kimeu, M Jeilan

Abstract

Aim: The impact of the COVID-19 pandemic on cardiology fellowship training in sub-Saharan Africa (SSA) is not known. This study aimed to determine the impact of the COVID-19 pandemic on fellowship training, and reviewed the adaptiveness of the existing training systems.

Methods: We conducted a three-month data survey related to the cardiology fellows' clinical exposure at the Aga Khan University Hospital, Kenya, before the COVID-19 pandemic and compared it with a three-month period during the pandemic. Hospital data volumes for patients' contacts, ambulatory and catheterisation laboratory procedures recorded during the periods of March to May 2019 (three months pre-COVID-19) and March to May 2020 (three months during the COVID-19 pandemic) were analysed. A comparative fellows' logbook evaluation of recorded cases was also conducted for the two study time periods. In addition, fellows answered a survey questionnaire related to their roles and responsibilities in the hospital, their views on cardiology training during the COVID-19 pandemic and the pandemic's impact on their training.

Results: There was a significant reduction in the volume of patients and cardiac procedures during the COVID-19 period compared to the pre-COVID-19 period. In the same line, the number of fellows' training episodes reduced significantly during the COVID-19 pandemic compared to their performances before the pandemic. Fellows felt that the COVID-19 crisis has had a moderate to severe impact on their fellowship training. They however noted an increase in the provision of virtual local and international meetings and conferences, which supported the training positively.

Conclusions: This study showed that the COVID-19 crisis resulted in a significant reduction in the total volume of patients and cardiac procedures and, in turn, the number

Department of Cardiology, Aga Khan University Hospital, Nairobi, Kenya

E Amendezo, MD M Ngunga, MD, mzeengunga@yahoo.com AH Ahmed, MD MH Varwani, MD B Karau, MD R Kimeu, MD M Jeilan, MD, Jeilan.mohamed@aku.edu of training episodes. This may have limited the fellows from achieving a great amount of skills base in highly technical skills by the end of their training. Opportunities for postfellowship training in the form of continued mentorship and proctorship would be a valuable option for the trainees if there is a similar pandemic in the future.

Keywords: COVID-19, cardiology fellowship training, Africa

Submitted 17/8/20; accepted 24/4/23 *Cardiovasc J Afr* 2023; **34**: online publication

www.cvja.co.za

DOI: 10.5830/CVJA-2023-023

The shortage of cardiologists in sub-Saharan Africa (SSA) has partly been attributed to disturbed training opportunities and a lack of fellowship programmes.^{1,2} Because of a shortage of specialists, fellowship programmes in SSA are delivered by a relatively small faculty base. This may leave them vulnerable to system stresses and less flexible or adaptive.

The first curriculum-based fellowship programme to cover both invasive and non-invasive adult cardiology in East Africa was launched by the Aga Khan University Hospital, Nairobi (AKUHN) in 2017. This three-year programme was designed to provide sufficient exposure to out-patient care, ambulatory cardiovascular diagnostics, acute cardiac care, including in-patient cardiology, cardiovascular research and to both invasive and interventional cardiac procedures.³ The programme was envisioned to train physicians through a combination of didactic lectures, hands-on procedure skills, simulator sessions, research electives and presentation skills development across all disciplines in cardiovascular care.

The reduction in clinical case volumes has necessitated adaptive changes to allow fellowship learning opportunities to continue.

The coronavirus 19 (COVID-19) pandemic provoked multiple deliberate and inadvertent responses, many of which disrupted the platform for healthcare delivery and training.⁴ Some countries noticed a reduction in visits to healthcare facilities, particularly for non-COVID-19-related care.⁵

In Kenya, the government introduced measures to contain rates of transmission in March 2020,⁶ and these included restricted travel across countries, closure of country borders, a curfew that kept people in their homes for many hours per day, and social distancing. Coupled with fear, anxiety and misinformation about the risks of exposure in healthcareproviding institutions, propagated by various media, and the knock-on effect on the economy, access to healthcare became extremely difficult.⁷

With the reduced volume of patients accessing healthcare, a reduced number of elective cases as mandated by guidelines,⁸ and a deliberate move to limit unnecessary clinician exposure due to limited access to personal protective equipment, and with hospital systems adapting through a redeployment of doctors, including trainees, an impact on training opportunities was inevitable.⁹

We set out to determine the impact of COVID-19 on patient contact in ambulatory and interventional procedures; to assess the impact on fellows' didactic training episodes; and to determine the adaptive changes that have been introduced either proactively or reactively in order to mitigate these changes.

Methods

We reviewed hospital statistics and clinical training logbooks to establish the volume of out- and in-patient cardiovascular care and training episodes, both prior to and after the introduction of government measures. To account for seasonal variation, we chose two identical time points, one year apart (March–May 2019 vs March–May 2020).

The AKUHN training programme is organised in six blocks, including (1) in-patient consultations and critical care unit coverage, (2) out-patient service, (3) ambulatory diagnostics, (4) invasive cardiology to include coronary and device therapy, (5) cardiovascular radiology, and (6) research. Rotations (1) to (4) are fixed blocks and have permanent fellow presence. Rotations (5) and (6) have fellows rotating intermittently.

To ensure consistency, we evaluated the fixed blocks in which fellows rotated throughout every day of the year. The following characteristics were evaluated for each month for total cases versus trainee cases for the pre- and post-COVID-19 era: internal medicine out-patient episodes, cardiovascular out-patient episodes, cardiovascular admission numbers, cardiovascular consultations, transthoracic echocardiograms (TTE), coronary angiography, coronary intervention, device

Table 1. Comparison of data volume for cardiac procedures and number of patients between March and May 2019 and March and May 2020		
Procedures	Pre-COVID	COVID-19
In-patient visits	956	537
Out-patient visits	1696	668
Transthoracic echo	761	501
Holter monitoring	53	87
Ambulatory blood pressure monitoring	35	16
Treadmill ECG testing	164	62
Dobutamine stress echo	14	9
Tilt-table testing	7	5
Coronary angiography	181	95
PCI	57	42
Right (and left) heart catheterisation	4	3
Device implantations (pacemaker, ICD, CRT)	18	20
Transoesophageal echo	11	10
Dobutamine stress echo	14	9
PCI: percutaneous coronary intervention; ICD: implantable cardioverter defi- brillation; CRT: cardiac resynchronisation therapy.		

implantation, transoesophageal echocardiography, treadmill electrocardiography (ECG), tilt-table testing and 24-hour Holter ECG monitoring.

Lecture and clinical presentation logs, research and journal club and clinical rounds logs were interrogated to identify the number of didactic teaching sessions delivered and to determine total attendance. Fellow training logs for each rotation were recorded.

We looked only at hands-on exposure. We evaluated fellows in years two and three of the three-year fellowship programme. All fellows completed a questionnaire to determine changes in their rota structure (whether they had been redeployed) and to determine their views on whether the COVID-19 pandemic had a positive or negative impact on their training.

Statistical analysis

Data are presented as numbers and were analysed using Microsoft ExcelTM.

Results

The total number of in- and out-patient episodes in the cardiology service and the number of cardiac procedures performed during both periods are presented in Table 1. Both in- and out-patient clinical cardiovascular episodes dropped significantly (Fig. 1). The number of clinical episodes and procedures dropped significantly, in many cases by more than 50%, during the COVID-19 period in virtually all clinical scenarios, with an increase seen only for device implantation and Holter monitoring (Figs 2, 3).

Figs 4 and 5 demonstrate the total number of cases/procedures performed by fellows during each specific rotation. In line with the reduced number of clinical episodes, we observed a reduction in the number of hands-on trainee procedures during COVID-19.

Four cardiology fellows fulfilled the inclusion criteria for both time periods and responded to the survey questionnaire. Their responses on the question regarding their training targets and expectations being met by the end of training are summarised in Table 2.







With regard to the didactic instruction, all respondents noted a significant increase in the number of didactic classes during the time of COVID-19. They reported an average of three to four didactic sessions per week during the time of COVID-19, while teaching sessions occurred once to twice weekly in 2019.

The official training schedule confirms an average of 3.5 weekly classes in 2020 compared with 1.8 in 2019. Many didactic sessions that had been scheduled for later in the year were brought forward in order to utilise the availability of the faculty and students. Moreover, respondents noted an increase in the provision of virtual local and international meetings and conferences, which supported their training positively.

All respondents reported a significant reduction in the number of cardiac patients across the hospital and in the number of cardiac procedures during the COVID-19 pandemic. All respondents



cathlab procedures. TEE: transoesophageal echocardiography, PCI: percutaneous coronary intervention.



observed a negative impact on the fellowship training, attributed to a significant reduction in contact with patients because of a reduction in patient visits and cardiac procedures. A quarter of respondents felt that this impact was severe.

Fellows had not adjusted their training expectations for cardiac procedures, namely TTE, coronary angiography as well as in- and out-patient cardiac care; all reported to not being sure that their training volume expectations in performing percutaneous coronary interventions (PCI), device implantations and transoesophageal echocardiography would be achieved. Nonetheless, all expressed confidence that they would achieve the minimum required technical competence by the end of their general cardiology training.

Interestingly, all year three fellows had already achieved the minimum requirement in numbers in certain procedures, such as



TTE, all of them having performed and interpreted at least 350 TTE studies at the time of the study.

Fellows did not feel a time extension to their fellowship programme was needed to catch up but agreed that a dedicated period of mentorship after the fellowship would increase their knowledge base and skills set. By and large, three of the four respondents planned to pursue advanced fellowship training, whereas one was undecided at the time of the survey.

Discussion

In a relatively new fellowship training programme tasked to offer solutions to a severe shortage of well-trained cardiologists in East Africa, the COVID-19 pandemic was shown in this study to result in a significant reduction in the total volume of patients in the cardiology service and, in turn, the number of training episodes, including both ambulatory and catheterisation laboratory (cathlab) cardiac procedures. There was an increase in didactic teaching sessions.

Fellows felt that the pandemic has had an overall moderate to severe negative impact on their training. The interesting increase in ECG monitoring episodes may reflect an increase in anxietyrelated problems or an increase in uptake of certain procedures due to administration of potentially arrhythmogenic drugs such as hydroxychloroquine and azithromycin, which were considered appropriate in the early phase of the pandemic.

In a similar survey in the New York metropolitan area, interventional cardiology fellows and their programme directors reported a significant impact on the fellows' training owing to reduced volumes of procedures, conversion of cathlab units into in-patient COVID-19 units, as well as redeployment of fellows to care for COVID-19 patients. The authors concluded that the pandemic has had a severe impact on the fellowship training, and suggested tailored opportunities for remediation in order for the trainees to achieve their ultimate goals and meet end-of-training expectations.⁹

In line with this observation, published data from the USA and Spain indicated an overall reduction, in the range of 38 to 40%, in ST-elevation myocardial infarction (STEMI) activations across high-volume cardiac centres in both countries, compared to the numbers of STEMI activations before the COVID-19 era.^{10,11} Indeed, the reduction in patients and procedural volumes has been observed in other non-cardiac training programmes, including surgical and anaesthesia programmes across the globe and in Africa.^{12,13}

Faculty and fellows from other African cardiology training programmes observed a similar decreasing trend in the training opportunities related to reduced volume. Many of these programmes have shifted to online and e-learning educational models in order to mitigate the challenges associated with the COVID-19 crisis.¹⁴

Although not a perfect measure of competence, procedural volume is used as a metric for the development of technical skills.¹⁵ We observed that many fellows had confidence that they would achieve the minimum required volumes for patient encounters and for certain procedures such as echo (TTE), Holter monitoring, treadmill testing and diagnostic coronary angiography by the end of their training, but were less confident about the development of more advanced skills in procedures such as PCI, device implantations and electrophysiology.

In anticipation, some suggestions from the fellows included additional training time in the specific areas of interest, or continued supervision during early cardiology career practice or on-the-job proctorship. These approaches have been considered appropriate responses to training in resource-limited environments.¹⁶

The increase in the number of didactic tutorial events and access to virtual conferences during the crisis is likely to impact positively on their knowledge base. The increased and eased accessibility to international virtual meetings and conferences suggests that the increased availability of teachers may be a global phenomenon although the proliferation of webinar training may have been borne out of a global necessity.

One observation was that most fellows had completed certain procedure volume targets such as transthoracic echo ahead of time in the programme. This was not expected by the trainers, but provided a cushion to allow focus in other areas. Systems that can adapt to allow fellows to shift their focus once competencies are achieved may be more adaptive than those that are rigid.

The response of the population to the pandemic was dynamic and unpredictable as the situation evolved and government restrictions changed. Our study emphasises the benefits of an adaptive system.

As far as fellowship training is concerned, there is still much unknown regarding the long-term impact of COVID-19, and it is not clear whether other cardiology training institutions in SSA should consider additional mentorship or training periods for their fellows.

The current evaluation was conducted over only three months into the pandemic and a repeat assessment at a later stage may clarify the findings. The present study highlights the effects of the COVID-19 pandemic on cardiology training and indicates the need for proactive flexibility in fellowship training delivery. Some of these may include more emphasis on skills transfer that does not depend on human subjects, such as a clinical scenario and procedure simulators; angiographic and echocardiographic review sessions; as well as enhanced use of e-learning platforms.

DeFilippis *et al.*, while observing that the COVID-19 pandemic resulted in a rapid transformation of medical education, emphasised that for fellowship training to be adaptive to the unprecedented changes brought by COVID-19, programmes will have to include virtual education and the use of social media to maximise trainees' experiences while maintaining their safety.¹⁶

Conclusion

This article provides insight into some of the challenges surrounding clinical training and delivery of clinical care during a global pandemic. The findings showed that the COVID-19 crisis resulted in a significant reduction in the total volume of patients and cardiac procedures and, in turn, the number of training episodes. While interviewed fellows felt confident about acquiring the minimum requirements by the end of their training, they may not have achieved enough skills base in highly technical skills such as PCI. Opportunities for post-fellowship training in the form of continued mentorship and proctorship would be a valuable option for trainees in the case of further pandemics.

References

- Kumar P. Providing the providers remedying Africa's shortage of health care workers. N Engl J Med 2007; 356(25): 2564–2567.
- Sliwa K, Zühlke L, Kleinloog R, Doubell A, Ebrahim I, Essop M, et al. Cardiology – cardiothoracic subspeciality training in South Africa: a position paper of the South Africa Heart Association. Cardiovasc J Afr 2016; 27(3): 188.
- Aga Khan University Hospital. Aga Khan University Cardiology Training Curriculum. 2020 Oct 21 [cited 2020 Oct 21]; Available from: https://www.aku.edu/mcea/medicine/Pages/Cardiology-education.aspx
- Hopman J, Allegranzi B, Mehtar S. Managing COVID-19 in low- and middle-income countries. J Am Med Assoc 2020; 323(16): 1549–1550.
- Driggin E, Madhavan MV, Bikdeli B, Chuich T, Laracy J, Biondi-Zoccai G, et al. Cardiovascular considerations for patients, health care workers, and health systems during the COVID-19 pandemic. J Am Coll Cardiol 2020; 75(18): 2352–2371.
- Aluga MA. Coronavirus disease 2019 (COVID-19) in Kenya: Preparedness, response and transmissibility. J Microbiol Immunol Infect Wei Mian Yu Gan Ran Za Zhi 2020; 53(5): 671–673.
- Gilbert M, Pullano G, Pinotti F, Valdano E, Poletto C, Boëlle P-Y, *et al.* Preparedness and vulnerability of African countries against importations of COVID-19: a modelling study. *Lancet* 2020; **395**(10227): 871–877.
- Welt FG, Shah PB, Aronow HD, Bortnick AE, Henry TD, Sherwood MW, et al. Catheterization laboratory considerations during the coronavirus (COVID-19) pandemic: from the ACC's Interventional Council and SCAI. J Am Coll Cardiol 2020; 75(18): 2372–2375.

- Gupta T, Nazif TM, Vahl TP, Ahmad H, Bortnick AE, Feit F, et al. Impact of the COVID-19 pandemic on interventional cardiology fellowship training in the New York metropolitan area: A perspective from the United States epicenter. *Catheter Cardiovasc Interv* 2021; 97(2): 201–205.
- Garcia S, Albaghdadi MS, Meraj PM, Schmidt C, Garberich R, Jaffer FA, *et al.* Reduction in ST-segment elevation cardiac catheterization laboratory activations in the United States during COVID-19 pandemic. *J Am Coll Cardiol* 2020 9; **75**(22): 2871–2872.
- Rodríguez-Leor O, Cid-Álvarez B, Ojeda S, Martín-Moreiras J, Rumoroso JR, López-Palop R, *et al.* Impacto de la pandemia de COVID-19 sobre la actividad asistencial en cardiología intervencionista en España. *REC Interv Cardiol* 2020; 2: 82–89.
- Al-Benna S. Impact of COVID-19 on surgical registrars' education and training. S Afr J Surg 2020; 58(2): 55–58.
- Sneyd JR, Mathoulin SE, O'Sullivan EP, So VC, Roberts FR, Paul AA, et al. Impact of the COVID-19 pandemic on anaesthesia trainees and their training. Br J Anaesth 2020; 125(4): 450–455.
- Kanmounye US, Esene IN. Letter to the Editor: COVID-19 and neurosurgical education in Africa: making lemonade from lemons. *World Neurosurg* 2020; 139: 732–733.
- Rwebembera J, Jeilan M, Ajijola OA, Talle M, Sani MU, Karaye KM, et al. Cardiac pacing training in Africa: endorsed by the Africa Heart Rhythm Association (AFHRA): JACC International. J Am Coll Cardiol 2020; 76(4): 465–472.
- DeFilippis EM, Schmidt ACS, Reza N. Adapting the educational environment for cardiovascular fellows-in-training during the COVID-19 pandemic. J Am Coll Cardiol 2020; 75(20): 2630.