

Impact of COVID-19 on cardiac surgical training: Our experience in the United Kingdom

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Abstract

The current evolving global pandemic caused by coronavirus disease-2019 (COVID-19) has dramatically impacted global health care systems, resulting in governments taking unprecedented measures to contain the spread of the infection, with adaptations by health care organizations. Research into understanding the pathophysiology behind this virus, to ascertain best medical management and treatment, has been accelerated to keep up with the rapidly evolving situation. There has been redeployment of medical and nursing staff to the frontlines and redistribution of health care resources. In addition, the cancellation of elective surgery and centralization of services to treat high-risk surgical cases will all, undeniably, have an impact on current surgical training with possible future implications. We aim to explore the impact COVID-19 is having on cardiac surgical training in the UK and what future implications this may have.

KEYWORDS

cardiac surgery, COVID-19, surgical training

1 | INTRODUCTION

Coronavirus disease-2019 (COVID-19), caused by the novel severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), appeared in late December 2019 following viral genome sequencing isolated from patients presenting with pneumonia of unknown origin, in the city of Wuhan, Hubei Province, China.¹ It precipitously led to a global public health crisis and was declared a pandemic by the World Health Organization on the 21 March 2020. COVID-19 remains a rapidly evolving situation, with over 4.2 million confirmed cases with over 290 000 deaths globally to date.

The COVID-19 pandemic has had an unprecedented impact on health care systems, now faced with an uncomfortable reality of the growing burden on health care resources with the need to rapidly adapt. The Royal College of Surgeons (RCS) released a joint statement in light of the pandemic, in which it states that acute

patients should be given priority acknowledging that patient will be disadvantaged and exposed to potentially increased risks. Furthermore, all patients should undergo COVID-19 testing and be considered to potentially have COVID-19 infection and those patients prioritized as planned urgent cases need to self-isolate at home, before admission for surgery.

With the need to redeploy the health care workforce to care for patients with COVID-19 due to the exponential increase in cases, and limited resources including critical care capacity, personal protective equipment, ventilators, and extracorporeal membrane oxygenation devices utilized to serve critically ill patients with COVID-19, the capacity to treat patients remains critically limited.

As such, training in many surgical specialities has been severely affected and in cardiac surgery specifically. Some of the workforce has been redeployed to other more acute units and some have been self-isolating at home because of symptoms or contact with patients having

COVID-19. The acceptance that only consultants or senior members should operate on these higher risk patients have diminished surgical trainee opportunities significantly. The Joint Committee on Surgical Training (JCST) have announced rotations would be suspended as this may result in an additional burden on the health care system in the current climate. However, the JCST have consequently announced that those trainees who are in need of further time to complete their training will be warranted with additional time to do so following the current pandemic, in order that the integrity of surgical training is maintained.

2 | GLOBAL IMPACT OF COVID-19 ON CARDIAC SURGERY

The strain on health care resources, despite efforts to increase hospital and intensive care capacity, has led to the need for rationing of medical equipment and interventions. Subsequently, countries have canceled/curtailed elective surgery and have centralized cardiothoracic services in an attempt to provide a service.²⁻⁴

Based on current observed disease trends, cardiovascular specialists will play an active role in the care of patients with COVID-19. COVID-19 infection may directly impact cardiovascular disease with studies showing that pre-existing cardiovascular disease predisposes to COVID-19 infection with elevated risk of adverse outcomes. Significant areas concerning COVID-19 and cardiovascular disease have been highlighted; 15% of patients with COVID have established cardiovascular comorbidities, and pre-existing cardiac disease is a risk factor for developing more severe infection.^{5,6} Furthermore, pre-existing coronary artery disease and patients with risk factors for atherosclerotic disease are at an increased risk of developing acute coronary syndromes during acute infection.⁷⁻¹⁰

COVID-19 results in vascular inflammation, plaque instability and myocardial inflammation,¹ consequently patients that suffer from an acute coronary syndrome and subsequently develop COVID-19 have a poor prognosis.¹¹ In addition, COVID-19 poses an increased risk in patients undergoing cardiac surgery, who are already characterized by a proinflammatory state, in the postoperative period. As a result, a higher mortality may be associated with patients undergoing cardiac surgery and subsequently developing COVID-19. Italy reported a COVID-19-related mortality of 12.8% and 20.2% in patients aged 70 to 79 and over 80s respectively, in which a large part of the cardiac surgical patient population fall.¹²

The indication for cardiac surgery is often based on evidence-based medicine but now, the RCS advises that nonoperative management where possible and reasonable should be implemented. In the current climate, the risk of delaying surgical care must be weighed against the risk of exposing patients to the hospital environment and risk of COVID-19 infection. Inpatient urgent surgical cases also need to be selected carefully based on their individual benefit and risk due to the associated cardiac risk of COVID-19. This has ultimately resulted in a shift of current practices and a reduction in referrals from cardiologists to minimize the burden on the health care system.

3 | IMPACT OF COVID-19 ON CARDIAC SURGICAL TRAINING

An emergency nation-wide lockdown was announced in the United Kingdom on the 23 March 2020, following examples from other countries, in an attempt to contain the spread of the virus. Cardiac surgery is heavily dependent on intensive care resources currently with limited capacity. As a result, cardiac surgery services have been centralized in an effort to continue to provide emergency and urgent cardiac surgical care. Daily multidisciplinary team meetings are taking place with the aim to identify patients that need urgent surgical intervention either from acute admission, in-hospital transfers, or in elective patients with deteriorating symptoms or anatomically prognostic disease.

During this period, cardiac surgery activity has been significantly affected, ultimately affecting training. In our center, the impact on the number of cardiac cases performed is shown in Figure 1, with a breakdown of the grade of the primary operator before and with the development of the COVID-19 pandemic. Due to the increased cardiac risks associated with patients having COVID-19, urgent patients generally being of higher operative risks and thus undertaken by consultants coupled with the significant reduction in case volume, training opportunities are greatly diminished.

It is also inevitably that there will be a backlog of future elective work with further potentially negative effects on patient outcomes and training, particularly if these patients go on to require urgent/emergency intervention as this pandemic continues. In addition, as a result of the lockdown measures and general anxiety, patients with progressive disease may delay their seeking medical care. Subsequently, these cases may carry higher surgical risk and ultimately be performed by consultants once again impacting training downstream.

The Society of Cardiothoracic Surgeons Pan London Emergency Cardiac Surgery group has advised that only two of the seven (of which we are one) cardiac surgical centers in London will provide a cardiac surgical service. The reduced opportunity for trainees at these two centers is shadowed by the fact that trainees at the remaining five centres will not have any opportunity for training in cardiac surgery, with this model ultimately extending across the rest of the UK.

Surgery is not the only aspect of training that has been affected; outpatient clinics have also been severely curtailed resulting in a reduction in nonoperative patient encounters. The consenting poses a further challenge as guidelines state that the current greater risk of adverse outcomes from potential COVID-19 infection post operatively should be factored in.

Ethical obligations to prioritize individual patient wellbeing may be superseded by a delicate balance of policies aiming to prioritize the greatest good for the greatest number of patients, either by premature withdrawal or cessation of care in cardiovascular patients. Trainees mental health may be affected witnessing decisions not to resuscitate or intubate an elderly patient, perceived to have a limited life expectancy or poor prognostic outlook, to allow resources to be allocated to those with a better prognosis.

In addition, clinical and educational conferences/courses are being postponed in an effort to ensure that trainees are available to

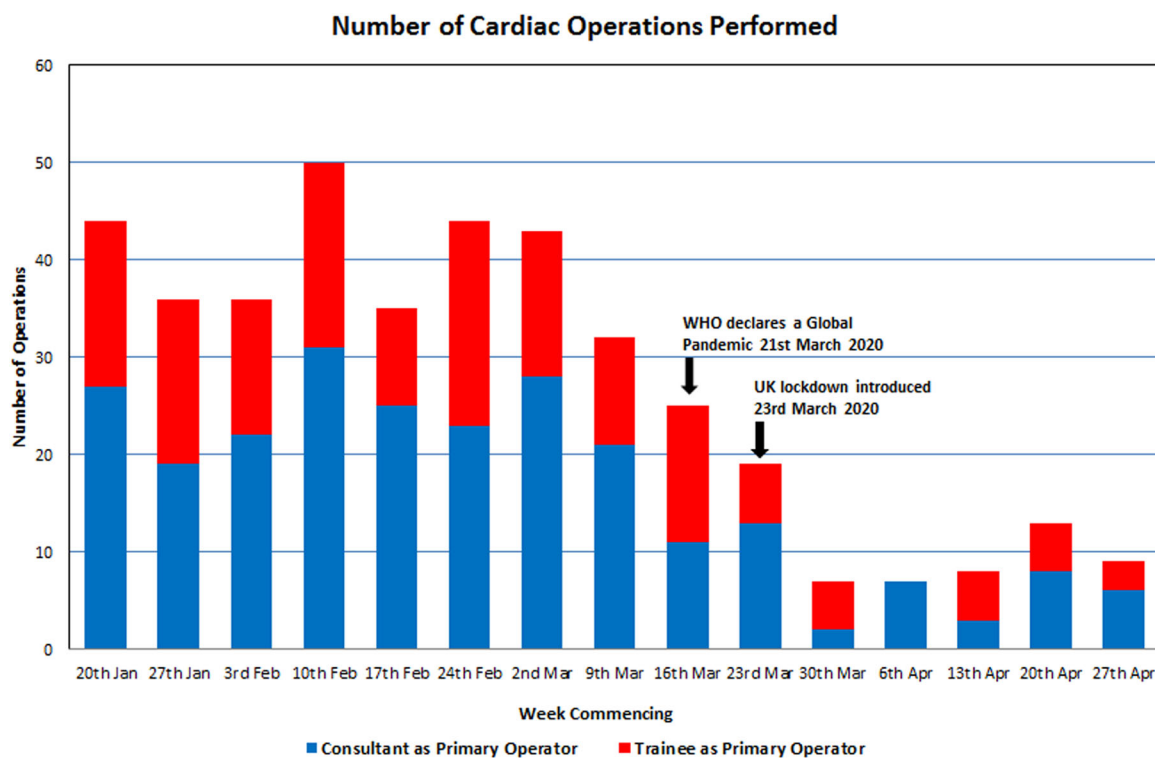


FIGURE 1 Number of cardiac operations performed by primary operator level at Barts Heart Centre, St Bartholomew's Hospital, London, UK

help health care services deal with the current pandemic and minimizing any potential risk of transmission of the virus. Although this would reduce any potential negative effects on the workforce and subsequently, patients, training will be further compromised.

The longer COVID-19 continues, the greater the impact will be on training. In the United Kingdom cardiothoracic training has recently been reduced from an 8-year run through program to a 7-year program, with specialization into either cardiac/thoracic fields selected during the 4th year of training. The impact on the long term from multiple lost months of training may be substantial, but the greatest impact may be felt by trainees in their penultimate and ultimate years of training. As a result, the COVID-19 pandemic will present further challenges and the assessment of trainees according to the normal curriculum will need to be interpreted and applied to the context of the pandemic. This raises challenges in the accreditation of these trainees, which is an important safeguard for the public.

The surgical workforce has had to adapt to the current climate and the Royal Colleges of Surgeons have published guidelines which include maintenance of emergency services, protecting the surgical workforce, and fulfilling alternate surgical and nonsurgical roles. Surgical fellows are being placed on rotating shifts consistent with clinical/surgical demands and to minimize exposure risk. The emergency redeployment of surgical trainees to other sectors and frontlines will not only have an impact on the quantity but also the quality of training as emphasis moves to service provision.

In light of the impact on training, the JCST in the UK has stated that the Annual Review of Competency Progression (process by which doctors in training are reviewed each year to ensure that they are

offering safe, quality patient care, and to assess their progression against standards set down in the curriculum for their training program) panels will continue to be able to review trainees' portfolios online, with the aim of ensuring that trainees were engaged in training and progress towards curriculum requirements had been on track before the COVID-19 outbreak. Requirements that have not been met due to the current circumstances would not be held against the trainee, with an opportunity offered to complete them, once the current situation is over. The JCST also recommends that trainees, who have/will not been able to sit the specialty exam before their provisional certification dates, should have their training extended to allow them to sit it at the next available opportunity. Those trainees who have already passed this exam and met all requirements should be allowed, to be accredited even if certain courses have not been completed on condition that the trainees' portfolio shows they will be safe to practice.

Whilst cardiac surgical training and educational events have been on hold, opportunities for developing innovative ways of delivering care either through telemedicine or virtual meetings and providing an opportunity for training in emergency planning, governance in extreme circumstances, major incident management, health care resilience, and medical leadership skills in these extraordinary circumstances, have developed. Despite these developments, an optimal patient-doctor relationship is still needed, whilst providing preventive care, comprehensive health counseling, and triaging of new conditions.

Cardiac surgeons are uniquely placed with a set of generic skills that apply to the management of critically ill patients and when extra intensive treatment unit (ITU) capacity is required, cardiac surgeons have taken on ITU roles normally performed by the intensivists.

The integrity of surgical training across all specialities and the sustainability of the workforce should be maintained as surgical trainees find themselves with the task of balancing service and education. In addition, reorganization of workflow and adaptation of educational milestones can help reduce the disruption to surgical training. The effects of COVID-19 on training can also potentially be mitigated by means of E-Learning (include viewing online lectures, web seminars (webinars) and podcasts) and simulation-based e-learning delivered in a variety of formats, including virtual patients, computer-based physiology simulators or advanced surgical simulators that allow practice of surgical procedures such as valve replacement or coronary artery bypass.

4 | CONCLUSION

The COVID-19 pandemic is an evolving global health care crisis; the impact in the current climate is evident, however there is uncertainty as to what the true cost will be. Many questions are being raised, with enormous efforts from the scientific community and with a second wave of COVID-19 expected by many health experts to be worse. The extent to which training and the process of accreditation will be affected remains uncertain, together with the uncertainty of the clinical state of the patients on elective lists that have been delayed. For now, all that is certain is that it is not "business as usual."

CONFLICT OF INTERESTS

The authors declare that there are no conflict of interests.

AUTHOR CONTRIBUTIONS

All of the authors of this publication made substantial contributions to the design of the work, analysis, and interpretation of data. All of the authors were involved in the drafting of the work and subsequent revisions. All of the authors approve of the final version to be published and agree to be accountable for all aspects of the work.

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