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## The Impact of 2020 and the Future of Cardiology Training: How Do We Innovate?


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## VIEWPOINT

### VOICES IN CARDIOLOGY

# The Impact of 2020 and the Future of Cardiology Training



## How Do We Innovate?

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### INTRODUCTION

The coronavirus disease-2019 (COVID-19) pandemic has dramatically changed health care around the world. Trainees were deployed to COVID duty, nonurgent cardiology services were cancelled, elective components in training programs were abandoned, video-based consultations were adopted, and volume of cardiology admissions reduced; all aspects of cardiology service provision were disrupted. These changes led to major disruptions in cardiology training and necessitated adaptation of nontraditional teaching methods.

### REDUCED PROCEDURAL VOLUMES

In the United Kingdom, some hospitals noted a >50% reduction in cardiology admissions and 40% reduction in the number of myocardial infarctions (1). In the United States, elective cardiovascular procedures were postponed and there was a 38% reduction in ST-segment elevation myocardial infarction activations (2). There was also a significant fall in the number of echocardiograms, cardiac stress tests, and diagnostic angiograms performed (1).

The reduction in case volumes affected trainee procedural competency and their candidacy for board

certification. Accreditation Council for Graduate Medical Education mandates a minimum of 250 percutaneous coronary interventions and American Board of Internal Medicine requires completion of 250 “therapeutic cardiovascular interventions” before trainees can apply for board certification. In a survey of 135 interventional cardiology trainees, 30% reported that they may not reach the 250 percutaneous coronary intervention requirement, 47% reported that disruptions in training reduced their procedural competency, 18% were interested in extending their training, and 80% reported working fewer hours (2).

In contrast to the apprehension among trainees, 97% of program directors believed that their fellows will be ready for independent practice despite the reduced case volumes, suggesting that competence is more complex than simple volume-based criteria and current volume-based assessments require re-evaluation (2).

The Accreditation Council for Graduate Medical Education recognized that traditional volume-based criteria may not be a feasible mode of assessment this academic year. It produced recommendations on competency-based assessment that can be used to guide decisions about trainee progression and the Fourth Core Cardiology Training Symposium (COCATS4) has a competency-based framework (3). Competency-based medical education encompasses setting personalized educational goals and frequent assessment. Trainees can be encouraged to do activities that they feel less confident about and available procedures can be distributed among trainees in an equitable manner.

### VIRTUAL TEACHING

Video conferencing is being used to host lectures, case discussions, and journal clubs (2). Virtual

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**TABLE 1** Examples of Some Online Resources to Support Physician Well-Being

Wellness Apps	Online Well-Being Resources
Headspace	ACP well-being champion program
Breathe2Relax	ePhysicianHealth
Virtual Hope Box	Kaiser Program for Physician Wellness
Take a Break!	Center for Mind-Body Medicine
T2 Mood Tracker	University of Colorado Behavioural Health and Wellness Program
Insight Timer	University of Rochester Mindful Practice
Meditation Rx app	Guided Meditation by Meditation Oasis

education made educational activities more accessible and permitted cross-institutional and cross-departmental collaboration. Virtual sessions have allowed for asynchronous learning, allowing trainees to view material at a later date and promoted trainees to revisit topics. It also promoted different styles of teaching that allowed for increased trainee engagement (i.e., live polling, screen-sharing, and the chat function).

Conferences are also now being hosted virtually, letting trainees learn from the wider cardiology community. Initiatives including American College of Cardiology's domestic Chapters are allowing trainees to share cases and contribute to quality care initiatives, providing unique opportunities for networking. Training programs have observed increased trainee participation in conferences.

### SIMULATION-BASED TRAINING

The pandemic has also reduced laboratory-based, hands-on learning and trainees are embracing simulation-based training. There are cardiac catheter laboratory simulators, echocardiographic simulators, and virtual reality-based simulations. There are also simulation algorithms that can identify trainee strengths and weaknesses, permitting personalized learning. Simulation training is shown to improve operator skills, reduce procedural time, reduce radiation dose/fluoroscopic time/contrast amount, and improve technical ability (4). Simulation is particularly advantageous in early stages of training when trainees can learn at their own pace, in a stress-free environment, with immediate feedback and repeated hands-on experience to improve dexterity.

### VIRTUAL CLINICS

Telephone/video consultations were used to minimize face-to-face consultations with some hospitals reporting a 90% reduction in face-to-face clinics (1).

Trainee education and staffing with attending physicians is being maintained during virtual clinics using various video conferencing features: one example is the Zoom "breakout room" feature, which permits trainees to set up private communication with the patient and then staff the case with the attending in a virtual breakout room. Although virtual clinics sacrifice the benefit of physical examination, it expands access to care and allows for more frequent visits.

### VIRTUAL ROUNDING

In some institutions, virtual rounds are being carried out with attendings wearing video camera headsets allowing trainees to evaluate patients, learn interesting physical findings, and observe effective interpersonal skills (5). A comprehensive clinical scenario can be recreated by virtually displaying imaging, blood results, and other supplementary material alongside. Trainees can discuss investigations and management approaches with the attending simultaneously. However, limitations include lack of direct patient interaction, inability to practice physical examination skills, and reduced feasibility for trainees to get feedback on their diagnostic and management skills with virtual rounding being primarily attending lead; after all, the patient is the best teacher.

### IMPACT ON TRAINEE RESEARCH

To increase the workforce, some trainees were pulled out of research placements. Trainees lost out on in-person mentorship and real-world research experiences. Major scientific conferences were cancelled, scientific data were not presented, and trainees missed out on networking opportunities. Sixty-two percent of the fellows reported cancelling attendance and 24% reported cancelling presentations at professional meetings (2). However, the pandemic resulted in enormous interdepartmental and interinstitutional collaboration to rapidly expand medical knowledge of this unknown virus. There was an incredible opportunity to organize clinical data to shed light on different clinical manifestations of COVID-19 and design basic science, translational, and clinical research studies. Many institutions leveraged the tremendous influx of patients with this little known disease to produce medical literature and thereby expand the research opportunities for the trainees. Programs should continue to support their trainees by allocating dedicated time for trainees to conduct research.

**IMPACT ON TRAINEE WELL-BEING**

During the pandemic, trainees were asked to work in unfamiliar clinical areas with critically ill patients sometimes with reduced senior supervision. Such disruptions to their training programs have had a toll on trainees with 65% of trainees reporting significant personal or home-life stress (2).

The pandemic has brought into force innovative ways to support trainees: provision of stress-relieving activities, such as mindfulness and yoga; trainee education on self-care and stress management strategies; and creation of multitude of telephone applications, online resources, podcasts, and blogs promoting well-being (Table 1). Programs are also using video conferencing to allow program directors to check in on trainees, organize virtual meetings allowing trainees to share coping strategies, and host virtual happy hours. Eighty percent of trainees reported having appropriate support to help them cope with the increased stress (2).

**FINDING EMPLOYMENT OR FURTHER TRAINING DURING COVID-19**





COVID-19 altered the trainee recruitment process: traditional in-person interviews were replaced by virtual interviews over videoconferencing platforms (e.g., Zoom, Cisco Webex Meetings, GoToMeetings, Google Hangouts). Advantages of virtual interviews include freedom from travel (time-saving, cost-saving, more environmentally friendly), access to more programs, and improved efficiency. Disadvantages include trainees not getting a wholistic view of the program, but this can be negated by organizing virtual hospital tours, videos, and virtual meetings between existing and prospective trainees. However, surveys indicated other challenges with recruitment including hiring freezes, fewer positions, and delayed start dates (2).

**LESSONS LEARNT**

Although the pandemic caused much disruption to cardiology training, it has provided opportunities to adapt and be innovative (Figure 1). We learned:

1. New ways of teaching and learning: 2020 has allowed for the integration of innovative teaching methods that use advances in technologies, such as video conferencing, e-learning, simulation training, and virtual reality. In the post-pandemic era, programs should continue to appropriately use virtual teaching platforms and simulation technologies given the multitude of advantages,

**FIGURE 1** Various Factors Affecting Cardiovascular Training and Potential Solutions to Mitigate Impact

Factors affecting training	Solutions
 Cancellation of elective procedures and decreased procedural experience	<ul style="list-style-type: none"> <li>• Competence based assessment</li> <li>• Simulation training</li> <li>• Equitable distribution of procedures</li> </ul>
 Social distancing requirement and cancellation of traditional face-to-face interactions	<ul style="list-style-type: none"> <li>• Virtual teaching – case-based discussions, film reviews, lectures</li> <li>• Virtual teaching clinics with video-conferencing between patient, trainee and attending</li> <li>• Virtual teaching rounds with live interaction between attendings and trainees</li> </ul>
 Decreased research and elective activities	<ul style="list-style-type: none"> <li>• Virtual conferences and research meetings</li> <li>• Virtual journal clubs</li> <li>• Protected research time</li> </ul>
 Stress of working in a pandemic	<ul style="list-style-type: none"> <li>• Mindfulness, yoga and stress management sessions</li> <li>• Virtual happy hours</li> </ul>

increased learning opportunities, and convenience they offer to complement traditional teaching methods.

2. Improved platforms to facilitate health care access: Telemedicine is likely to remain a long-lasting legacy in the post-pandemic era. The increased efficiency it offers can be used to tackle the post-pandemic backlog and its advantages of

permitting service provision to patients regardless of their geographical location will be beneficial going forward.

3. New ways to assess competency: The pandemic has allowed the opportunity to re-evaluate historical assessment methods and permitted for new trainee assessment methods to be trialed. Competency-based assessment are being positively received by trainees and program directors: the personalized approach will allow trainees to identify their individual weaknesses and preferentially work on these.

## CONCLUSIONS

Adoption of novel methods can make cardiology services more convenient, cost-effective, time-saving, environmentally friendly, and globally collaborative. However, going forward, an appropriate balance needs to be achieved given the importance of bedside teaching, physical examination, and the benefits of face-to-face interaction.

Efforts should be taken to ensure equitable clinical practice: virtual platforms are not accessible to all and may disproportionately disadvantage those from low socioeconomic backgrounds.

At the beginning of the pandemic, there was some reticence about pursuing some of these initiatives but they have quickly become the norm. We should seize the opportunity to be innovative, resilient, and adaptive; to find new ways to address the challenges the pandemic has thrown at us and help trainees gain skills, make themselves more competitive, and fill the gaps in their knowledge.

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