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**Impact of COVID-19 on medical education and resident burnout
in a postgraduate programme**

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Coronavirus disease 2019 (COVID-19) was first reported in Wuhan, China, in December 2019, and officially confirmed in Singapore on 23 January 2020.⁽¹⁾ At the time of writing, we had the opportunity to look back at our two months' experience navigating several challenges in continuing graduate medical education during the pandemic and wanted to share our journey with those in similar situations.

ACGME-I (Accreditation Council for Graduate Medical Education International) began to accredit programmes in Singapore in 2009, including our SingHealth Gastroenterology Programme. In this programme, 14 residents undergo three years of training at three major sites: Singapore General Hospital, Changi General Hospital and Sengkang General Hospital, and residents often rotate across hospitals for different postings. On 7 February 2020, Singapore announced the elevation of the DORSCON (Disease Outbreak Response System Condition) alert from yellow to orange. Several issues subsequently emerged for postgraduate programmes. Singapore is a small country with only a few hospitals capable of handling large volumes of isolated, acutely unwell patients. In such situations, residents are highly involved in the model of care, as they are often freshly trained in intensive care medicine and have a broader grasp of general medicine. As such, Singapore had to centralise their pool of residents for deployment to hospitals handling these cases. Many residents were thus taken out of their training in order to work in isolation and pneumonia wards. In view of a national partial lockdown on human movement, face-to-face teaching was also prohibited, along with a reduction in inpatient and procedural cases for learning, and cancellations of examinations.

Our first intervention for teaching was delivering all content electronically. Various available video conferencing and audience response systems were used to achieve this. Although residents were limited to different hospitals or isolation wards, they were still able to participate in teaching sessions, and we were able to record our teaching sessions in the

form of video and audio files, allowing residents who were involved in shift work to view the material offline and log their attendance. Many faculty members who previously were not able to attend the sessions due to work commitments or locations now also participated from their homes or procedure rooms. The ease of setting up collaborative teaching sessions encouraged the hospitals to each set up their own teaching sessions, and our attendance numbers for the programme doubled, together with the number of teaching sessions.

Before the pandemic occurred, we were using a hybrid model using principles and tools of competency-based medical education (CBME) within a fixed-time model, similar to countries such as the United States and Canada, mainly due to logistical constraints.⁽²⁾ The COVID-19 pandemic resulted in several challenges, requiring us to modify the manner in which we implemented our CBME system (Table I). Our goal in planning these interventions was to deliver a standardised form of learner-centred training despite the major disruptions. Even though the needs of our healthcare system and trainees evolved during this period, CBME – as a set of concepts, principles and tools⁽²⁾ rather than a fixed doctrine – gave us the flexibility to implement some of these interventions while maintaining the principles of CBME. For example, we are starting a simulation-based endoscopy teaching course to adjust for the lack of real cases by having a stronger focus on achieving competencies rather than numbers. Additional material containing principles of protective personal equipment and assessing a patient's COVID-19 risk profile is also being introduced to the trainees. For these interventions to be effective, however, much buy-in was needed from faculty and residents, and thus clear communication strategies and frequent faculty development were crucial during this period of change.

Table I. Changes to the CBME system during the COVID-19 pandemic.

Pre-COVID-19 hybrid approach	Challenge due to COVID-19	Solutions
Fixed, time-based 3 years of training; completion of 3 years of training is part of the criteria to successfully exit the programme.	Residents may spend a prolonged period of time outside the programme, thus the total training time may be less than 3 years.	Residents still complete a total of 3 years of training. CCC determines competency at the end of training regardless of the total time spent within gastroenterology training.
Final assessment prior to completion of training is a written/oral exam focusing on medical knowledge. Quantitative scores from exam and WBA tools are more important to determine progression and competence.	Exam was postponed due to national lockdown on human movement, and alternate methods to determine completion of programme had to be sought.	CCC decides on competence to complete the programme based on WBA assessments. Faculty development to emphasise the rationale and importance of qualitative feedback to build narrative on competence.
Residents are assessed on 6 predefined desired competencies, as per ACGME-I within the context of our gastroenterology programme (e.g. communication skills in a gastroenterology patient).	Residents are taken out of their gastroenterology learning environment and placed in pneumonia/isolation wards where the supervising faculty are not gastroenterologists.	Assessment tools to measure competencies are sent to supervising faculty from other departments. Competencies such as system-based practice and interpersonal communication skills should be generalisable across departments.
Authentic daily tasks are assessed using WBA tools, but mainly to inform incompetence to CCC. WBA tools are often in paper form and collected at the end of rotations.	Residents and faculty are scattered in various hospitals, and the decreased interaction between faculty and residents due to constant changes in service obligations makes collection of assessment forms difficult.	Web-based assessment tools have been created for timely feedback regardless of working site. The focus of WBA tools has been shifted to inform competence and make decisions on progress. This is enforced with faculty development programmes.
Direct observations and focused feedback are part of the WBA toolbox, but the choice of cases is often directed by faculty. EPAs are known to faculty but not implemented on the ground as an assessment tool.	Residents have reduced exposure to gastroenterology cases due to reduction in clinics and being rotated into non-gastroenterology wards. Exposure of residents to learning cases is also variable, depending on the hospital site.	Self-assessment of EPAs by residents is advocated using the EPA checklist (supplementary material). A crash course is given to residents on how to use this form to self-assess and plan learning opportunities purposefully. Residents are advised to collect learning cases in a portfolio for discussion with programme director to assess EPAs and

		competencies.
Each resident is given a mentor to provide learning tailored to each learner’s progression.	Mentor-mentee relationships are disrupted due to residents and mentors being sent to different hospitals, resulting in a lack of physical interaction and communication.	Programme director and selected faculty are to take overall control of longitudinal monitoring of attainment of competencies and progress. The EPA checklist form is used to assess gaps and make actionable plans to fill those gaps throughout training.
Competence in procedures is determined by the total number of procedures performed and direct observation assessment.	Reduced number of elective procedures result in an inability to achieve total numbers.	Endoscopy simulation course is being introduced to adjust for the lower number of available cases. More direct observations are being arranged to ensure competency in procedures despite the lower numbers performed. Qualitative feedback with direct observations is enforced to improve skills.

ACGME-I: Accreditation Council for Graduate Medical Education International; CBME: competency-based medical education; CCC: clinical competency committees; COVID-19: coronavirus disease 2019; EPA: entrustable professional activities; WBA: workplace-based assessments

Another issue that emerged was burnout among our residents. Previous studies^(3,4) in our resident population showed that burnout rates were higher than in our Western counterparts. Though we had no opportunity to quantitatively measure burnout rates during this period, our personal interactions with residents revealed several factors that potentially contributed to worsening burnout. Residents assigned to pneumonia/isolation wards were often separated from colleagues, and many imposed self-isolation periods away from their families while in these wards. Social interactions with families and colleagues^(5,6) are protective factors against burnout, and losing both simultaneously can precipitate burnout. There was also a loss of autonomy among residents, as they could be deployed at short notice to any hospital and any situation that required manpower. Such a move disrupted their training and reduced their usual case and procedural loads, both of which contributed to the

residents' fears about their training completion and career progress. This was compounded further when they were told that end-of-training exams had been postponed. Residents mentioned fear for their own health as they were in the frontline doing swabs and caring for infectious patients. Furthermore, these gastroenterology trainees had been taken out of their comfort zone to manage severe pneumonia patients and often had to learn how to operate ventilators and dialysis machines at short notice.

As part of the programme, we felt that it was better for us to intervene to prevent burnout rather than reacting to cases that were occurring. At the hospital level, a 24-hour hotline with a psychologist was created and weekly mindfulness sessions were planned over video conferencing, but we felt that this was not enough. We believed that it was initially best to create a clear and open channel of communication between the programme director and the residents. We frequently had to address the job uncertainties, training disruptions and lack of procedures, among many new issues that appeared. To support these measures, we provided formal letters from the programme to recognise residents' rotations in the pneumonia/isolation wards as part of their training and created supplementary teaching programmes for those whose training was disrupted. These included additional endoscopy sessions to log case numbers with supervision, as well as video conferencing tutorials and reading list compilations for those who missed parts of their training. We made it a point to engage residents in the isolation/pneumonia wards by communicating with them over social media or email frequently, such that they felt the programme was supporting them through the difficult time. We implemented a 'no questions asked' policy in the event of any resident taking sick leave, during which faculty members cover for them. As programme director, I stepped down to serve in the pneumonia/isolation wards together with my trainees as a sign of solidarity. All teaching activities were re-evaluated and many cancelled activities to free up time for residents to recharge. Faculty members also stepped down to take over clinical

workloads that residents were assigned to do. Looking back at these interventions, a few probably helped to some extent, although we could have done better in many ways. It is truly easy to ignore burnout among our residents during a time when every other issue seems more pressing.

Amid the uncertainty about COVID-19, we were aware of the lessons learnt during our experience with severe acute respiratory syndrome (SARS) and other similar experiences found in the literature.⁽⁷⁻⁹⁾ Our biggest takeaway from SARS was the need for a coordinated national effort for contact tracing and containing the infection, which therefore resulted in early implementation of the aforementioned policies. Many countries will be thrown into similar situations as ours, especially smaller countries where doctors may be placed in a central pool and deployed throughout the country. This causes major disruptions to training, and we found that adjusting how we implemented CBME was helpful to mitigate some of the changes that occurred. Through our experience, we also became aware of how easy it is to burn out for residents involved in such disruptions. Most available literature involves undergraduate education in pandemics, but different challenges affect postgraduate education. While undergraduate students may be barred from seeing live patients,⁽¹⁰⁾ the biggest challenge for postgraduate education is balancing the tension between service and education. Our battles have likely only begun in this era of medical education amid the COVID-19 pandemic. We hope that when the situation stabilises, we can further reflect on our actions and objectively measure what was useful.

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