



Review article

COVID-19 and the impact on surgical training and education in Singapore

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ABSTRACT

The COVID-19 pandemic has affected surgical education and training significantly. The main impact to surgical residency training is the reduction in number of patients (in caseload and case mix) and the conversion of face-to-face meetings into virtual ones for CME and clinical governance-related events. Assessment of surgical residents by examination (namely the Joint Specialty Fellowship Examination with the College of Surgeons of Hong Kong and the Royal College of Surgeons of Edinburgh) was cancelled at the peak of the pandemic, with resumption after acceptable COVID compatible adjustment was made to the format. The migration of CME events into a web-based one has resulted in greater connectivity with more audience. The potential and challenges of virtual format in surgical education include strategy and resources for sustainability; choice of optimal model for effective learning and surgical skills acquisition. In a post-COVID world, the model of blended learning is likely to remain.

1. Introduction

In 2020 right through 2021, the COVID-19 pandemic disrupted lives and services worldwide. In Singapore, a governmental multi-ministry taskforce (MMTF) spanning trade and industry, transportation and healthcare initiated a series of public health measures with public resources reorganised and diverted to diagnose (through targeted, regular and mass screening), avert (through strict border control), contain (through time-specific lockdowns, quarantine, social distancing and mask use), treat and prevent (through mass vaccination) the progression of crisis [1, 2].

In healthcare in particular, to conserve resources and to contain transmission, clinical team structures were re-organised and workflow adjusted to minimise the risks of spread. Non-essential elective operations, including minimally invasive surgery (MIS) and endoscopy were suspended [3]. Out-patient workload was also reduced to allow staff deployment to high-need clinical areas [4, 5] and non-essential consultations were either postponed or converted to virtual consultations via teleconsultation.

These multiple measures implemented by the MMTF, whilst necessary, also affected surgical education and training significantly.

2. Impact on surgical residency training

Surgical residency training in Singapore is currently based on the US model of residency and accredited by the Accreditation Council for

Graduate Medical Education (ACGME) International [6]. Training is administered through three healthcare clusters, viz. Singapore Health Services (SingHealth), National Healthcare Group (NHG) and National University Hospital System (NUHS) with training activities and programmes run separately.

Throughout this period, the main impact to surgical training was the reduction in number of patients. At the height of COVID, a drop in up to 60% of operative volume was found in surgical residents in North America & Europe based on a review of their operative logs [7, 8, 9, 10]. With reported workload reductions of between 26 to 70% in various surgical services in the public hospitals in Singapore [11, 12, 13, 14], it is likely that surgical residents here had a similar impact to their operative training. Given that many elective, non-urgent and common ('bread and butter') cases were postponed or cancelled, this would have affected the surgical repertoire of the residents. Further study in these areas is awaited.

For clinic consultations, planned reductions of up to 50–70% led to reduced numbers seen by residents. The Ministry of Health, Singapore (MOH) has licensed medical/dental practitioners and healthcare institutions to use telemedicine in patient-related care under the Health Services Provider Act during this period. This initiative allowed for some degree of care continuity and also training. Ward-based training was also impacted, with reduced team sizes, split-teams and cohorted practice leading to further reduction in clinical exposure of the residents.

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In addition, all face-to-face in-person clinical meetings, including multidisciplinary tumour boards, clinical case conferences, surgical skills workshops, hospital-based teachings, etc were cancelled. The use of telemedicine in patient-related care endorsed by MOH was extended to educational activities with clinical governance components such as multi-disciplinary tumour boards and mortality and morbidity conferences. Webinar-based technology was also rapidly adopted to bridge the gap in teaching and training, with the added advantage that since this was not location specific, the new web-based teachings could be attended by residents from all three clusters, breaking geographical barriers and silos and enhancing shared learnings. Preparatory courses for examinations also transited from physical events to web-based sessions, with the College of Surgeons of Singapore running a series of Zoom-based revision courses for general surgical residents in Singapore, Hong Kong and beyond.

Whilst adaptations were made to try to keep training as thorough as possible, the many changes implemented and the uncertainty and anxiety over safety is potentially associated with a decrease in well-being score and risks of burnout which could impair learning, although this has not been adequately evaluated [15, 16].

3. Impact on surgical residency assessments

Surgical residency assessments take the form of continual work-based assessments, annual knowledge-based in-training examinations (ITE), and summative assessments with multiple choice question (MCQ) examinations in partnership with the American Board of Medical Specialties (ABMS) and clinical evaluations using viva voce and clinical examination formats as a tripartite Joint Specialties Fellowship (JSF) examinations with the College of Surgeons of Hong Kong (CSHK) and the Royal College of Surgeons of Edinburgh (RCSEd) [6].

With restrictions to face-to-face events, limited sizes of gatherings, need for social distancing, and no cohorting of healthcare providers from different institutions, the conduct of ITE and summative MCQ examinations had to be modified. Candidates had to report at staggered times, sit in isolated workstations at least 1 m apart, and stay masked throughout. The standard setting and form review meetings held between local examiners and faculty from ABMS based in the US were converted to web-based sessions due to travel restrictions, and was limited by time-zone differences between the two countries.

For the JSF examinations, as these were normally held with participation of examiners from Edinburgh and Hong Kong, and also required patients for the clinical examination, there was a need for significant adjustments to be made. In 2020, the usual March and August diets of the JSF, held in Hong Kong and Singapore respectively, were cancelled as the exams could not be properly conducted given the COVID restrictions in place then. This caused some delay to the exit from training and subsequent promotions of some residents. With time to prepare and adjust, the first COVID-compatible examination was held in December concurrently in Hong Kong and Singapore. Social distancing measures put in place included staggered reporting times, separate waiting areas for individual candidates, Perspex barriers specially constructed to separate candidates from examiners (Figure 1), and the use of Zoom platform for overseas examiners and assessors from Hong Kong and Edinburgh. For the clinical examination component, due to limited patient numbers and restricted access to hospitals, the format was amended to viva voce with in-depth discussion of four clinical cases. The impact was deemed to be acceptable as all residents undergo a structured curriculum including work-based assessments of clinical competency.

The pass rate of the JSF examination in the past three diets is no different from that during the pre-COVID era. Although there was no clinical skills component in the modified examination, throughout their residency, residents undergo continuous clinical skills assessment (through Work-Based Assessment (WBA) and Direct observation of procedural skills (DOPS)), as well as assessment by Residency Advisory Committees (RAC) prior to being allowed to sit for JSF exit exam after



Figure 1. Perspex separation between examiner and candidate and the use of web-based platform for examination.

review of their operative log books and supervisor reports. There is no formal study to review the impact/impression of the new exam format to candidates/examiners as there have only been three diets thus far. After each diet, debrief with examiners amongst the three parties (local, Hong Kong and Britain) has been conducted to improve the exam. Also, separate review has been held at the (Ministry of Health, Singapore) MOH Exams Committee.

4. Impact on continuing surgical education

Continuing medical education (CME) is a key component of maintenance of competency for healthcare professionals. In Singapore, the College of Surgeons, Singapore and various surgical societies and organisations run CME programmes on a regular basis. During the pandemic, these physical face-to-face activities and conferences migrated into a virtual platform. Interestingly, many have reported a larger number of attendees compared to physical meetings, probably due to the easier accessibility especially for busy clinicians.

Participation and attendance at surgical meetings and conferences is also a key component of CME, with these being the ideal forum for presentation of research work, networking, exchange of ideas and collaboration. Despite Singapore being a top hub for MICE (meetings, incentives, conferences, and exhibitions) [17], in 2020 up to 92% of the regional and international conferences were postponed or cancelled due to strict border controls worldwide. Surgeons and residents were also unable to attend overseas conferences and meetings, many of which were cancelled. Over time, conversion of many of these to virtual congresses and webinars have enabled greater connectivity in a time of border restrictions, and interestingly also led to higher attendances as the cost is much less without the need to travel.

A few surgical societies have also increased social media usage to reach out to a greater audience. The Endoscopic & Laparoscopic Surgeons of Asia (ELSA) headquartered in Singapore, for example, has used Zoom for webinars, Facebook for live-streaming & YouTube for archives of its webinars. This 'network effect', with the use of scalable, web-based technology on multiple platforms, has increased the presence of the organisers, speakers and the value to the targeted audience.

5. Opportunities and future directions

The push to a virtual format in many aspects of life during this pandemic has shown the potential of virtual technology. Proprietary and

open-platform software and technological hardware (including wearables) can potentially be developed for use in teaching, mentoring, feedback, assessments and validation of training modules. However, surgical trainers and educators will need to address several challenges like sustainability and costs, variations in delivery models and applicability for surgical skills training.

Firstly, sustainability of digital education in surgery requires long term strategy and resources. After an initial phase of knowledge curation with the development of framework and content building, there is a need for regular administration and update of the curriculum and content as surgical practice continues to advance. In addition, the archives and data analytics will require digital storage in cloud or servers that will need continued expansion over time. Both the initial development and subsequent expansions require significant costs and resources.

Secondly, variations in models of digital learning, either open or closed, add to the complexity. Open platforms that exist in public domains like EDx, Coursera and YouTube have potential to reach a wider audience, including learners from the developing world as long as they have an internet connection, and already feature medical-themed courses (e.g. ATLS 10th edition and update questions at Udemy). Conferences and lectures deposited digitally at such platforms are the modern equivalent of Gutenberg which was used previously to immortalise written manuscripts in the 15th century. On the other hand, closed platforms (e.g., University-based networks for teaching and assessments) are password-protected and access-limited and requires security to guard privacy, licensing, intellectual property and potentially sensitive information (such as patient data), and hence have a more limited reach.

Lastly, the final frontier for virtual application, is perhaps in the acquisition of surgical skills which traditionally followed an apprenticeship model of 'see one, do one, teach one'. In the COVID-era, surgical training is now conducted in very small groups, oftentimes with full personal protection equipment (PPE), and limited cadaveric or animal use for fear of infection risk. With skills training, in particular for minimally invasive surgery (MIS), video capture and transmission is ideal and a wealth of operative videos already exists in various platforms including on YouTube. The Japanese Society of Gastrointestinal Surgery (JCOG) has long been using video review to assess the competence of surgeons in cancer surgery, prior to recruitment into clinical trials. Certificate courses in MIS run by ELSA and IRCAD (Institute for research Against cancer of the Digestive tract) already comprises online lectures, and video masterclasses. A web version of the Non-Technical Skills for Surgeons Workshop (NOTSS) has also been developed for on-line delivery [18]. Another example, the app version of the Advanced Trauma Life Support (ATLS) course called myATLS, developed before the onset of the pandemic, appeared to be effective in its delivery format, with potential to supplement or even replace some aspects of the practical workshop [19]. Online surgical education of basic surgical skills appeared to be effective compared to face-to-face teaching, with potential to circumvent the limits imposed by the COVID crisis [20]. From these examples, it would seem that web-based technology can enable a wider audience with the potential that soft skills and to some extent technical, operative skills can be taught in the virtual world.

6. Conclusion

Whilst the COVID pandemic has brought about major disruptions especially to healthcare and the training of doctors and surgeons, this has also brought about opportunities. Technological advances have enabled telemedicine to be adopted rapidly in patient care, surgical education, training and assessments. Surgical knowledge in digital format can now be commoditised to reach out to a wider audience, and blended learning, combining online and face-to-face teaching, is likely to remain in the future of surgical education, training and assessments in the post-COVID world.

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