Reinstating a national simulation programme in anaesthesiology during the coronavirus pandemic

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ABSTRACT

Background With the introduction of strict public health measures due to the coronavirus pandemic, we have had to change how we deliver simulation training. In order to reinstate the College of Anaesthesiologists Simulation Training (CAST) programme safely, we have had to make significant logistical changes. We discuss the process of reopening a national simulation anaesthesiology programme during a pandemic.

Methods We approached how to reinstate the programme with three distinct but intertwined projects, as in the following: (1) a survey of effects of the pandemic on training opportunities for anaesthesiology trainees, (2) proposals for methods of reinstating simulation were developed under the headings *avoidance, compromise, accommodation* and *collaboration*. A small online video-assisted simulation pilot was carried out to test the *compromise* method, (3) having opted for combined *accommodation* (onsite with smaller participant numbers and safety measures) and *collaboration* (with other regional centres), a postreinstatement evaluation during a 4-month period was carried out.

Results (1) Eighty-five per cent of 64 trainees surveyed felt that they had missed out not only just on simulation-based education (43%) but also on other training opportunities, (2) when five trainees were asked to state on a 1 to 5 Likert scale (strongly disagree, disagree, undecided, agree and strongly agree) whether online video-assisted simulation was similar to face-to-face simulation in four categories (realism, immersion, sense of crisis and stress), only 9 (45%) of the 20 answers agreed they were similar, (3) When onsite simulation was reinstated, the majority of trainees felt that training was similar to prepandemic and were happy to continue with this format.

Conclusion In order to reinstate simulation, we have identified that *accommodation* and *collaboration* best suited the CAST while *compromise* failed to rank high among trainees' preferences. Onsite courses will continue to be delivered safely while meeting the high standards our trainees have come to expect.

Key messages

- Anaesthesiology trainees in Ireland felt that training opportunities, including simulation courses, were being lost due to the effects of the pandemic.
- In order to reinstate the College of Anaesthesiologists Simulation Training programme and adhere to public health measures, we had to make significant logistical changes to the delivery of the simulation courses.
- It is possible to continue simulation-based education during the coronavirus pandemic maintaining the high quality our trainees have come to expect.

What is already known on this subject

- The coronavirus pandemic has forced a move to online medical education at local, national and international levels. Simulation-based education has continued in situ during the initial lockdown as a tool for teaching and upskilling healthcare workers. Guidelines for the safe reopening of simulation centres have been more recently published.

What this study adds

- The experience of a national simulation centre and how it successfully continued to deliver simulation courses during a pandemic which trainees felt were comparable with prepandemic courses. Using nomenclature from the Thomas-Kilmann conflict resolution strategy, a method for delivering simulation was created around each component in order to decide how best to continue simulation courses during the pandemic.

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INTRODUCTION

The coronavirus pandemic has forced a complete rethink of how medical education is delivered.[1 2] Recent publications have highlighted the possible adverse consequences of the pandemic on training and education.[3 4] Such reports have also focused on how the medical education community has responded, in terms of preparing for the pandemic[5] and, also, in changing how ongoing medical education is delivered.[6] For example, there was a significant move to online education[1] in the form of video conferencing and webinars as the pandemic progressed, from local departmental teaching to international conferences.[7]

The value of simulation-based education has become clear as many healthcare organisations had to deploy and upskill their staff in order to cope with the challenges of the pandemic.[8–10] Internationally in the initial wave of the pandemic, in situ simulation training took place in donning and

doffing of personal protective equipment,[11] airway management[12] and protection against aerosol generating procedures,[13] management of cardiac arrest[14] and intensive care procedures such as prone positioning.[15] In the meantime, traditional education institutions such as universities and medical training bodies[16] had to temporarily close their doors and abandon onsite education activities.

The College of Anaesthesiologists of Ireland (CAI) conducts a comprehensive mandatory College of Anaesthesiologists Simulation Training (CAST) programme for Specialist Anaesthesiology Trainees (SAT). During the pandemic, a rethinking was required both in terms of continuing simulation and therefore ensuring specialist training progression as well as in terms of finding suitable alternatives.[17 18]

In keeping with strict Irish Government restrictions, which included closure of all education settings, the CAI had to be fully closed for onsite activities in March 2020, and the CAST programme was, thus, suspended for the remaining of the academic year, which coincided with the first viral wave March to June 2020. The CAI reopened for onsite activities in September 2020. After a short time, Ireland experienced its second wave of the pandemic from October 2020 with a peak in the 14-day incidence of 307 per 100 000. However, in keeping with public health advice, essential postgraduate education (that could only be carried out face-to-face) was permitted and continued at the CAI until December 2020.

Reopening the CAI simulation centre in September involved making significant logistical changes to how the courses were delivered,[4 19] while continuing to deliver the same content and high standard that trainees had come to expect. Ensuring the safety of staff, delegates and faculty was of paramount importance, but we also wanted to ensure that we delivered a worthwhile educational experience.[17] Guidelines for reopening simulation centres have more recently been published by a number of organisations.[20 21]

This paper describes the process, which led to the reinstating of the CAST programme as well as the outcomes of evaluations conducted at various stages of the process. The decisions were supported by two moderately size surveys and a small pilot, to ensure that the users of simulation views are being taken into account.

METHODS

An exemption from full ethical review was sought from and awarded by the Office of Research Ethics University College Dublin on the basis that our study involved standard educational practices and anonymous surveys of nonvulnerable participants in relation to nonsensitive topics.

The process of reinstating simulation at the CAI in the second part of 2020 consisted of three distinctive but intertwined projects, as in the following:

Survey of effects of the pandemic on training opportunities for anaesthesiology trainees

An online survey was carried out in the summer of 2020 to establish the extent to which anaesthesiology trainees felt the pandemic had disturbed their training, identify what alternative training and learning opportunities had been available to them during the lockdown and identify if and how teaching had continued in anaesthesiology departments across the country.[18]

Proposals for methods of reinstating simulation training during the pandemic

The proposals for reinstating simulation training at the CAI were based on an adaptation of the nomenclature used in Thomas and Kilmann's conflict resolution strategy,[22] that is, avoidance, compromise, accommodation and collaboration. A method for delivering simulation was created around each component and the pros and cons to each were listed.[17]

- *Avoidance* meant that no simulation courses were to be conducted until simulation could be safely reinstated on site in its original format.
- *Compromise* meant that onsite simulation was to be replaced with video-assisted online simulation.
- *Accommodation* meant that courses were to be conducted onsite with reduced staff, delegate and faculty numbers and strict adherence to social distancing, personal protective equipment and other safety measures;
- *Collaboration* meant collaborating with other simulation centres in order to continue the conduct of mandatory training while minimising travel to the CAI simulation site.

In order to evaluate the *compromise* method, we piloted a small online video-assisted simulation session. A group of experienced anaesthesiology trainees in their final year of training,[17] who had participated in multiple CAI simulation courses prior to the pandemic, viewed a historical video of an airway emergency simulated scenario via an online video-conferencing platform. The learning objectives were in relation to the management of a difficult airway patient in an intensive care setting. The video was paused at predetermined timepoints and an instructor facilitated discussions in relation to technical and nontechnical aspects (eg, compliance with difficult airway guidelines, situation awareness, fixation error), as seen throughout the scenario. A postsession survey was distributed among participants to evaluate on a five-point Likert scale how does video-assisted simulation compare to onsite simulation in the following categories: realism, immersion, sense of impending crisis and stress (box 1). Trainees were also asked whether they would like to do future simulations through an online format.

Evaluation of simulation training during a 4-month period after the reinstatement of the programme

A number of changes were carried out in order to facilitate onsite simulation during the pandemic. The number of participants was reduced from 12 to 8 and faculty and confederates numbers from five to four while maintaining a faculty: participant ratio of 1:3 or 1:4. All delegates were asked to fill out a precourse screening questionnaire in order to evaluate the risk of viral transmission. As the delegate holding and debriefing area were moved to a remote lecture hall to facilitate social distancing, the delegates not actively participating in the simulation scenario were able to view the scenario via a live video feed. A maximum number of four and three people were allowed in the simulation and control room, respectively. Other alterations consisted in the introduction of protective and safety measures as recommended by the public health authorities and internal risk management review, for example, simulation with a limited number of people in rooms, strict people movement flow, visual cues for social distancing, mask wearing, hands and surface cleaning and others.

All delegates attending CAI simulation courses in an *accommodation* format during a 4-month period (September–December 2020) were asked to complete an anonymised 8-question survey aimed at comparing the prepandemic and postreinstatement courses (box 1). The postsession questionnaire referred to the

Box 1 List of questions asked in the *compromise* and the *accommodation* method postsession surveys

Compromise method. Postpilot survey

1. What career grade are you?
2. How many simulation courses have you attended?
   a. 0–3
   b. 3–6
   c. 6+
3. I found the scenario easy to follow. 1–5*
4. I found this online simulation a useful learning experience. 1–5*
5. Did you have the opportunity to ask questions? Yes/no
6. Was the image resolution OK? Yes/no
7. Was the sound quality OK? Yes/no
8. How does the online simulation compare to face-to-face simulation? 1–5*

Accommodation method. Postreinstatement survey

1. How many simulation courses have you attended?
   a. 0–3
   b. 3–6
   c. 6+
2. I found the scenario easy to follow over video conferencing when compared with previous simulation format. 1–5*
3. Was the image resolution OK? Yes/no
4. Was the sound quality OK? Yes/no
5. The simulation is similar to previous simulation format in the following categories: 1–5*
   a. Realism
   b. Immersion
   c. Sense of impending crisis
   d. Stress
6. Participation in the debrief with video conferencing was similar to the previous simulation format. 1–5*
7. Overall, I would be happy to continue simulation in the current format during the pandemic. 1–5*
8. Is there anything else we can do to improve the experience?

*5-point Likert scale where 1–5 (1 disagree strongly, 2 disagree, 3 undecided, 4 agree, 5 agree strongly).

easiness of following the scenarios and debrief in a remote viewing format, whether there were differences in terms of realism, immersion, sense of impending crisis and stress levels as well as questions about the quality of the image and sound (since the remote viewing also involved an upgrade of the audio-visual system including cameras, speakers and microphones to catch the action and sound in full). The trainees were also asked whether they would be happy to continue simulation with remote viewing, social distance and protective measures for the duration of the pandemic (box 1).

RESULTS

Survey of effects of the pandemic on training opportunities for anaesthesiology trainees

Sixty-four responses were received from an estimated 392 trainees (response rate 16%) from various training sites (of which 59% were Dublin-based) and with a range of experience, that is, 42% were at senior house officer/SAT 1–2 level and 58% were at registrar/SAT 3–6 level. This represented a 19% response rate among all SAT enrolled in the CAI specialist

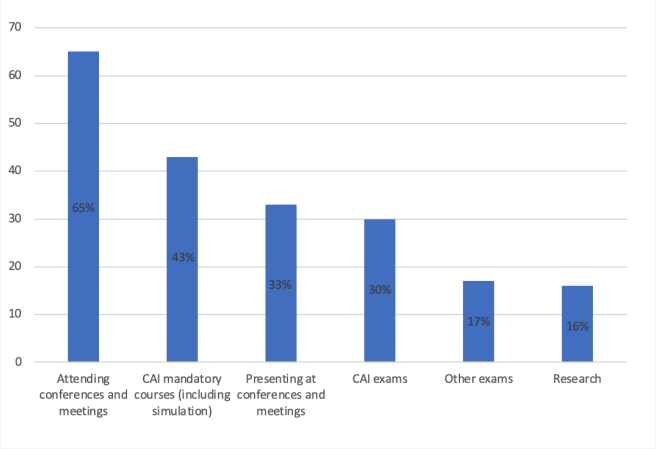

Figure 1 Percentage of trainees surveyed who felt that they had missed out on training opportunities in several categories. CAI, College of Anaesthesiologists of Ireland

training programme. Eighty-five per cent of respondents felt that they lost out on important training opportunities during the first 6 months of 2020, with 28% strongly agreeing that this was the case. Forty-three per cent of those surveyed felt that they had missed out on an opportunity to attend onsite simulation at the CAI national simulation centre (figure 1). Eighty-four per cent reported that the amount of teaching in their departments had decreased in comparison to prepandemic volume. However, 75% respondents felt that they had the opportunity to participate in alternative training opportunities of which 44% participated in in situ simulations (figure 2). Of those who participated in simulation, 76% were trained in the donning and doffing of personal protective equipment, 70% in airway management in an operating theatre setting, 61% in airway management in an intensive care setting and 33% in cardiac arrest. Twenty-one per cent of respondents were involved in designing simulation training.

Testing *compromise* as a method for reinstating simulation training during the pandemic

There were five trainees taking part in the video-assisted simulation pilot. Eighty per cent of the trainees had attended at least six onsite simulations prepandemic. An overall majority of those surveyed (80%) agreed or strongly agreed that video-assisted simulation was a useful learning experience and that they would like to do future simulations through an online format during

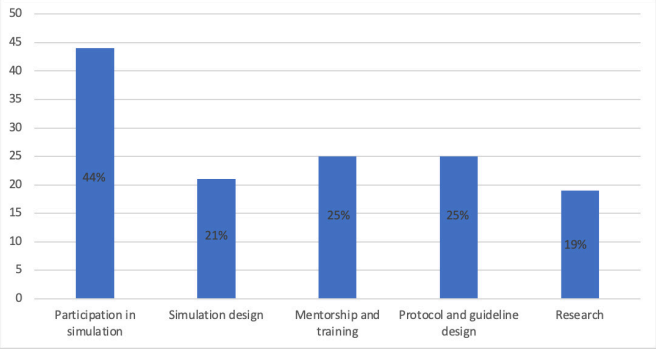

Figure 2 Percentage of trainees surveyed who felt they had the opportunity to participate in alternative training opportunities in several categories.

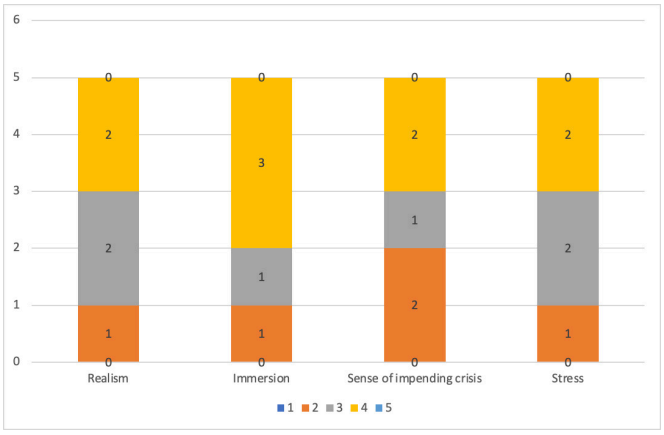

Figure 3 Number of trainees who participated in the Compromise format post-session survey who agreed with the statement 'Pilot simulation is similar to face-to-face simulation in the following categories: realism, immersion, sense of impending crisis and stress' on a 5-point Likert scale (1 strongly disagree, 2 disagree, 3 undecided, 4 agree, 5 strongly agree).

the pandemic. However, several stated that online simulation was a worthwhile initiative only if onsite simulation was not possible. When the five trainees were asked to state on a 5-point Likert scale (1 strongly disagree, 2 disagree, 3 undecided, 4 agree, 5 strongly agree) whether online video-assisted simulation was similar to face-to-face simulation in four categories (realism, immersion, sense of crisis and stress), only 9 (45%) of the 20 answers agreed they were similar, whereas 6 (30%) and 5 (25%) were undecided and disagreed, respectively (figure 3).

As a result of this video-assisted simulation exercise as well as brain-storming meetings with CAI staff, course leads and faculty, a decision was made to pursue a combination of the *accommodation* (onsite with smaller participant numbers and safety measures in place) and *collaboration* (with other regional centres) in relation to reinstating simulation training.

Evaluation of simulation training during a 4-month period after the reinstatement of the programme

The CAI successfully conducted 13 onsite simulation courses during September–December 2020. All 91 delegates received the survey and 40 responded, which represents a 44% response rate. More than a third of delegates (37. 5%) had attended at least three simulation courses before the pandemic (figure 4). Seventy-eight per cent agreed or strongly agreed that the new format was as easy to follow when compared with the old format (figure 5) .

The majority of delegates found that in the categories of realism, immersion, sense of impending crisis and stress, the new format was similar to the prepandemic format of simulation. Eighty-six per cent of answers either agreed or strongly agreed (figure 6). The only category where any delegates disagreed with this statement was in the category stress, that is, 10% of those surveyed disagreed or strongly disagreed they were similar (figure 6). Eighty-six per cent of candidates agreed or strongly agreed that the participation in debriefing was similar to the old format (figure 7). The vast majority of those surveyed (97.5%) agreed or strongly agreed that they would be happy to continue with simulation in the current format during the pandemic. There was also positive feedback that the image and sound quality were satisfactory with 97% and 90% agreeing, respectively.

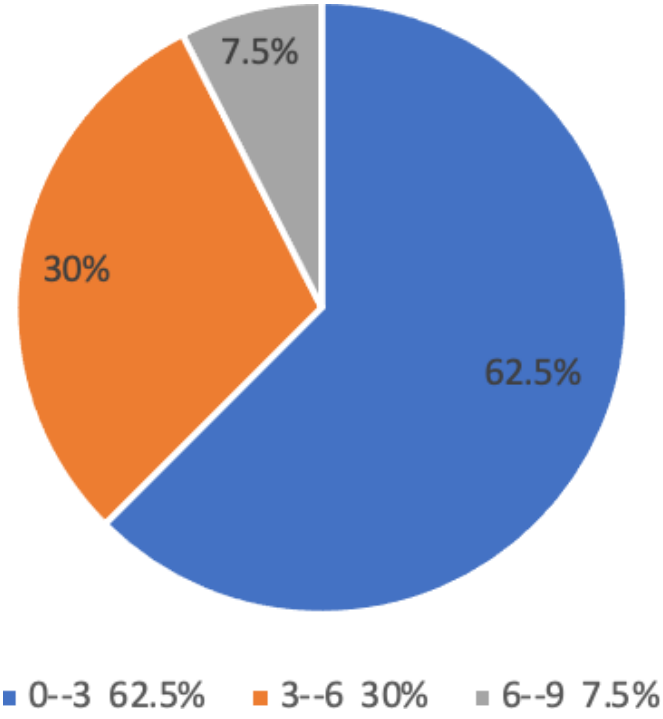

Figure 4 Percentage of trainees who participated in the accommodation format post-session survey who had attended between 0–3, 3–6 and 6+ simulation courses.

DISCUSSION

Reinstating the CAST programme during the pandemic was not going to be an easy decision, not merely because of public health restrictions and logistics issues but also because of our strong commitment to continue delivering mandatory simulation training while ensuring trainees' progression through the SAT scheme.

A survey carried out during the first viral wave and lockdown showed that trainees in anaesthesiology felt that important training opportunities were lost because of the pandemic.[18] Simulation and other experiential learning courses rated high on the list of CAI activities that had been missed out by trainees. Individual teaching hospitals swiftly switched to video-assisted grand rounds, mortality and morbidity, journal clubs and other similar suitable for online delivery, whereas only a limited

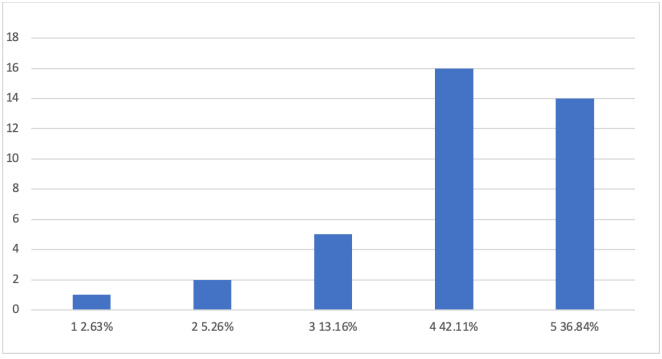

Figure 5 Percentage of trainees who participated in the accommodation format post-session survey who agreed with the statement 'I found the scenario easy to follow when compared to previous simulation format' on a 5-point Likert scale (1 strongly disagree, 2 disagree, 3 undecided, 4 agree, 5 strongly agree).

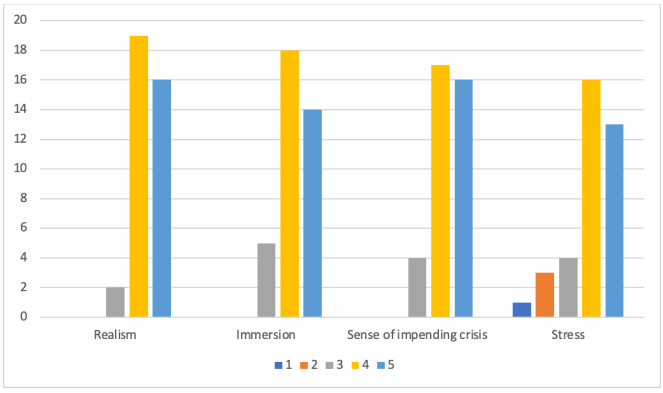

Figure 6 Percentage of trainees who participated in the accommodation format post-session survey who agreed with the statement 'The simulation is similar to previous simulation format in the following categories realism, immersion, sense of impeding crisis and stress' on a 5-point Likert scale (1 strongly disagree, 2 disagree, 3 undecided, 4 agree, 5 strongly agree).

proportion of the face-to-face teaching continued. Eighty-four per cent of trainees surveyed reported that the amount of teaching in their departments had decreased in comparison to prepandemic volume and was conducted mainly via video-conferencing facilities (81%) with only 19% face-to-face teaching. However, a significant proportion (80%) also reported that alternative training options became available. Reassuringly, the survey showed that simulation at the CAI national centre had been replaced to a certain extent with hospital-based simulation initiatives with 44% of trainees surveyed taking part in in situ simulation focused mainly on areas relevant to the pandemic such as donning and doffing of personal protective equipment, airway management, patient positioning and cardiac arrest.[18]

Nevertheless, the comprehensive mandatory CAST programme, which encompasses multiple single and multispeciality anaesthesia courses as well as subspecialty anaesthesia and intensive care courses had been put on hold because of the pandemic. The CAI felt it was important, therefore, to reinstate the programme as soon as possible while staying aligned to national population health and internal risk management policies. In an original adaptation of the nomenclature used in Thomas-Kilmann conflict resolution strategy,[17] we planned

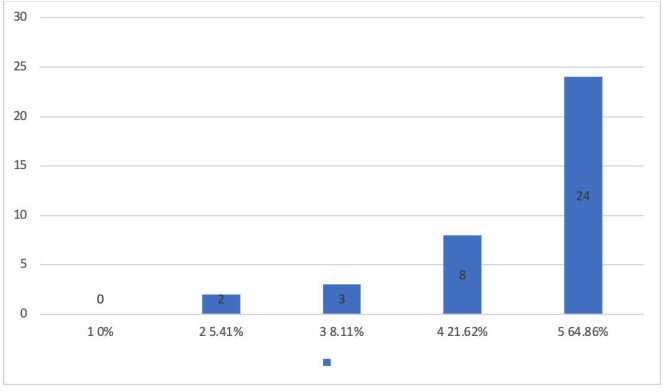

Figure 7 Percentage of trainees who participated in the accommodation format post-session survey who agreed with the statement 'Participation in the debrief with video conferencing was similar to the previous simulation format' on a 5-point Likert scale (1 strongly disagree, 2 disagree, 3 undecided, 4 agree, 5 strongly agree).

and tested how to safely deliver simulation training during the pandemic, a method which, to the best of our knowledge, has not been reported before by any other group to date.

During the first half of 2020, in line with the national restrictions and the experience of other education institutions, an *avoidance* approach was undertaken, whereby all simulation courses were cancelled from mid-March. Arguments in the favour of this method were that we would be taking no risks at exposing delegates to the virus. However, the disadvantage to this method was that trainees would miss out on mandatory training courses. This would particularly impact the trainees in their final year of training who would not have the opportunity to partake in these essential training at a later date. *Avoidance* of simulation was compensated to a certain degree by local hospital-based initiatives, as reported earlier.

Significant consideration was given to running the simulations in an online format combined with some onsite activities were feasible, that is, *compromise* method. The advantages to this method were that no physical presence of delegates was required on site and that we could continue courses with larger delegate numbers. However, a series of limitations were identified, that is, the availability of archived simulation videos and confidentially issues around historical videos. There was a general view that developing and filming new video-assisted simulation scenarios was required which was not feasible in the amount of time available to us. The feedback from the video-assisted pilot simulation exercise was generally positive with 80% agreeing it was a useful learning experience. However, only 9 out of 20 answers (45%) agreed that realism, immersion, sense of impending crisis and stress were similar to those encountered in face-to-face simulation, with several participants surveyed commenting that video-assisted simulation would be preferable only if face-to-face simulation was not available, for example, '*Yes, if it allows us to do simulation, obviously physical simulation is better*"; "*If compared to no simulations*' and '*I think this is a good way of learning about critical incidents, and certainly it is better than nothing*'.[17] This reinforced the value of hands on simulated experiential learning that cannot be totally replaced by online activities.[19 23]

It was carefully thought that the *accommodation* method would allow simulations to continue onsite in a face-to-face format. Arguments against this method would be reduced delegate numbers limiting the amount of places available to trainees able to attend simulations. Adjustments would have to be made to the format of the sim course to ensure public health measures were applied.

Finally, the *collaboration* method would involve arranging courses at other simulation sites around the country. The arguments in favour of this option would be avoiding delegates having to travel outside of their geographical catchment area. A collaborative approach was initiated, which involved six CAST courses being conducted in collaboration with other regional simulation centres.

As a result of the initial survey, small video-assisted simulation pilot as well as brain storming meetings involving CAI staff, course leads and faculty, it was agreed that a combination of *accommodation* and *collaboration* was best suited to reinstate the CAST programme. Measures for social distancing, face masks, hand washing etiquette, peoples' movement flow, and so on were thoroughly introduced prior to reinstating simulation in September 2020. As reported, there was very positive feedback from the delegates surveyed in relation to the postreinstatement format introduced by the CAI during the pandemic.

Our study has several limitations. First, there was a low response rate (64/392 or 16%) to the initial survey in relation to training opportunities during the pandemic, which, anecdotally, is lower than previous experience with anonymous surveys sent out to the same population of trainees. A logical explanation would be that anaesthesiology trainees were on the frontline of the fight against the pandemic at the time and their availability for surveys was sparse. We cannot rule out the possibility that a higher response rate could have led to different answers. However, the data do offer a snapshot of the sort of activities that took place in anaesthesiology departments during the first wave of the pandemic.

A second limitation was the small size of the online video-assisted simulation with only five trainees taking part. However, reassuringly, 80% of participants had attended more than six simulation courses prepandemic, therefore had sufficient experience and understanding of simulation at the time of the pilot.

The CAI is planning to continue with onsite simulation training while staying aligned with government and public health authority restrictions. Notwithstanding that the programme is a mandatory requirement for training progression, the anaesthesiology trainee hugely value the opportunity to participate in the national CAST programme and develop their technical and nontechnical skills to deal with a variety of crisis. Over 97% of delegates surveyed were happy to continue simulations in this new format during the pandemic. Reassuringly, there were some overwhelmingly positive comments left by delegates, as in the following: "*I thought …[the course was]… very good, given circumstances. Grateful for continued effort at providing sim courses during a pandemic*"; and, "*Excellent work done by CAI to continue simulation throughout the pandemic in a safe and interactive environment.*"

In conclusion, by providing well-structured simulation training that remains focused on anaesthetic emergencies in general, subspecialty as well as multidisciplinary critical scenarios, the CAI continues to train its trainees to provide the best care to patients. Adapting simulation facilities and the course format enabled us to continue to safely deliver medical education during the pandemic. Although we have had to make many adjustments to how we deliver simulation courses, we continued to maintain the high quality of simulation training that trainees had become accustomed to. There is a strong commitment from the CAI and its trainees to continue with this invaluable method of experiential learning. Simulation training will remain a core activity of the CAI with long-term implications on future generation of anaesthesiologists who must continue to learn how to deal with the challenges of our specialty in the interest of patient safety.

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Contributors SCo developed the concept for the first survey. CLB developed the concept for the pilot and further two surveys and reviewed draft manuscripts. SCa and SCo responsible for acquisition of data, analytics, data interpretation and writing of the main article.

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