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COVID-19 and the anaesthetist: a Special Series

Practical strategies for delivering airway training in the COVID-19 era

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The COVID-19 pandemic has had a significant impact on all aspects of airway training worldwide as changes in clinical practice have been introduced to ensure patient and staff safety.^{1–4} Reduced opportunities for hands-on airway management experience, in operating theatres and critical care settings,⁵ have resulted in UK anaesthetic trainees reporting a 65% reduction in perceived adequacy of training opportunities, with a corresponding reduction in operating theatre cases logged the first wave of the pandemic.⁶ With worldwide cases of COVID-19 continuing to rise,⁷ concern about new COVID-19 variants with vaccine-evading characteristics and experts warning of the high chance of a third wave in the UK,⁸ it is likely that COVID-19 precautions will be in place for some time to come and that this issue will be relevant for the foreseeable future.⁹

Reduced opportunities for learning

The fall in airway training opportunities is multifactorial; here, we consider UK practice as an example, although the same is

likely to apply in many countries. COVID-19 airway guidelines recommend that the most experienced clinician acts as first intubator and that the number of staff present at intubation is minimised.^{1–4,10} The Intubate-COVID study reported that the most senior airway manager intubated in 70% of cases.¹¹ Many anaesthetic trainees were redeployed to ICUs, resulting in reduced time in theatres: in the UK in December 2020, one in six anaesthetists was unavailable to work in operating theatres.¹² In the UK, almost half of NHS elective operations were cancelled, and worldwide an estimated 28 million cases suffered disruption in the first 3 months of the pandemic.¹³ Many anaesthetists have increased their use of regional anaesthesia to avoid perceived aerosol-generating procedures^{9,14} and reduced their use of supraglottic airways.¹⁵ Personal protective equipment hampers communication between trainer and trainee, making feedback and discussion much more challenging.⁹ Finally, widespread cancellation of courses, conferences, and workshops has limited hands-on procedural practice.

Strategies to optimise airway training in theatre

Increased use of videolaryngoscopes

Videolaryngoscopes have been shown to be better teaching tools than direct laryngoscopes,¹⁶ with advantages applicable to all grades of trainee. Novice intubators can be taught to intubate using a videolaryngoscope with a blade, such as a Macintosh that also enables direct laryngoscopy, with the trainee and trainer using the shared view on the videolaryngoscope screen to identify the relevant structures and allow the trainee to intubate the patient with minimal assistance. Once a trainee is felt to be ready, intubation training can be continued with the videolaryngoscope screen turned away from the trainee or the screen covered. This ensures that the trainee learns direct laryngoscopy skills under direct supervision, with the facility for immediate assistance, and maximises the trainee's opportunity to complete the intubation alone. For more senior trainees, a videolaryngoscope enables them to take on more challenging cases while being coached in real time, and allows them to learn the (different) techniques necessary for using a hyper-angulated blade videolaryngoscope.¹⁷ A sign of adaptation of standards, in June 2020, the UK Royal College of Anaesthetists (RCOA) accepted that videolaryngoscopes (with a Macintosh-shaped blade) could be used to teach direct laryngoscopy to trainees undertaking their Initial Assessment of Competence, provided that direct laryngoscopy is demonstrated in a simulated environment.¹⁸

Many COVID-19 airway guidelines emphasise videolaryngoscopy to improve patient and intubating team safety.^{1–4,19} Videolaryngoscopy can increase first-pass intubation success,^{17,20} reduce failures,²⁰ increase the distance between the intubator and the patient's airway,²¹ and mitigate some of the impediments posed by personal protective equipment.²² Use of a videolaryngoscope with a screen discrete from the blade is associated with improved teamwork, communication, and 'flattening of the hierarchy' within the intubating team.²³ The videolaryngoscope has changed from being primarily an airway rescue device to being increasingly advocated as the first-choice device in more recent guidelines.^{1 2 9 24} In a recent report, 76% of intubations of patients with COVID-19 during March–June 2020 were performed using a videolaryngoscope as the first-choice device, with 90% first-pass success¹¹; this is higher than previous reports of 80% in other critically ill cohorts undertaken without personal protective equipment.¹ Increased videolaryngoscope availability and use offer a training opportunity for all staff groups, especially for more junior trainees and anaesthetic assistants¹⁷ working in settings where patients have been screened for COVID-19 and preoperatively self-isolated, while ensuring that the 'first attempt at intubation is the best attempt'.¹⁶ Expertise with hyper-angulated videolaryngoscope blades can be gained when managing airways predicted to be straightforward, ensuring that all staff are familiar with the required skills.¹⁷ Videolaryngoscopy techniques learnt during the COVID-19 pandemic may enable many anaesthetists to move into the category of 'experienced videolaryngoscope user'.²⁴

Training in new locations

During the waves of the COVID-19 pandemic, many operating theatres lay unused because of cancelled elective operating lists. In some hospitals, these empty theatres were used for in situ simulation training (often as a multidisciplinary team),

hands-on 'workshop-style' practice of airway rescue techniques using manikins, and familiarisation of staff with emergency airway algorithms (McGuire B, personal communication, 2021). This idea was expanded further by making the senior 'training' anaesthetist allocated to this operating theatre also responsible for identifying training opportunities in other theatres (e.g. awake tracheal intubations and intubations requiring the use of a hyper-angulated videolaryngoscope) and allocating trainees accordingly. This ensured that the quantity and quality of airway training were maximised even if the amount of time that anaesthetic trainees spent in theatre was limited.

'Tea trolley training'²⁵ provides 'bite-sized' educational interventions, where trainers come to the staff in their workplace to deliver training, often accompanied by refreshments as an incentive, rather than staff having to leave their workplace to attend training. A trolley is prepared with training materials on the top and refreshments underneath, and is taken from theatre to theatre providing multidisciplinary training in anaesthetic rooms, operating theatre recovery wards, delivery suites, and ICUs.¹⁷ It has been used effectively in over 45 UK hospitals, and in Australia, the USA, Canada, France, Germany, and Zambia, for teaching trainees new procedures and skills (e.g. those required to manage an unpredicted difficult airway) plus allowing more experienced clinicians the chance to rehearse rarely performed skills (e.g. emergency front-of-neck airway access) and preventing 'skill decay'.²⁶ COVID-19 adjustments to this training method include limiting group size, use of personal protective equipment, and cleaning training materials between teaching sessions (Fukuta J, personal communication, 2021).

Private sector hospitals have been used in the UK to provide consultant-delivered elective patient care for NHS patients during the pandemic, further limiting anaesthetic trainees' training opportunities. Health Education England has now encouraged hospitals to adjust anaesthetic trainees' contracts to allow them to anaesthetise with consultants in private hospitals, so increasing opportunities for in-operating-theatre airway training.²⁷

Strategies to optimise locally delivered out-of-theatre training

COVID-19 safe airway workshops

Traditional out-of-theatre airway workshops,²⁸ with stations teaching practical airway skills and techniques, often one station covering each of Plans A, B, and D of the 2015 Difficult Airway Society (DAS) guidelines,²⁹ and airway simulation training sessions are now subject to COVID-19-related infection prevention and control measures. Strategies to adjust such workshops for the COVID-19 era include running workshops in empty operating theatre suites rather than in anaesthetic departments or education centres (operating theatres have significantly improved ventilation, reducing the risk of COVID-19 transmission)¹; limiting group sizes to six staff or less at any one time; using an online booking system rather than staff 'dropping in' or waiting together in large groups; rotating groups in a one-way manner; extra time to allow equipment cleaning between groups; and using digital rather than paper attendance registers, feedback forms, handouts, and certificates of attendance to improve infection control. Flipped classroom learning involves students studying online before attending workshops in person to reduce

face-to-face training time.³⁰ Training opportunities for awake tracheal intubation have been especially limited during the pandemic, and the portable ORSIM® bronchoscopy simulator has been shown to be useful for addressing this.³¹

Use of video platforms

Peer-viewed simulation using multiple cameras enables trainees to join a simulation training session via remote link from distant safe sites. Trainees can watch a small group of colleagues taking part in a scenario and learn from their simulation experience,³² take part in peer-led debriefing, and benefit from reflective learning about both technical and non-technical skills. Such sessions and the debrief can be recorded, if it is emphasised that this is optional and with appropriate informed participant consent and controlled access, enabling learning to be shared by those not able to attend in real time.

Regular virtual mortality and morbidity meetings have been successfully run by many departments. In addition to providing a chance to discuss clinical cases, such meetings allow trainees to keep in touch with colleagues, including those who are shielding, and many have commented on the beneficial effect on their well-being (Millinchamp F, personal communication, 2021).

Regional 'hybrid' workshops have been trialled: centrally delivered lectures and demonstrations were delivered by videoconferencing, followed by skill stations in hospitals throughout the region led by local faculty. This mixed method maximised the number of delegates able to engage with the course while avoiding the risk of magnified COVID-19 transmission caused by multiple attendees from different hospitals (Cope T, personal communication, 2021).

Video platforms have been used to provide film-based virtual teaching sessions via videoconferencing. Four 5 min simulation videos,³³ produced for the World Airway Management Meeting 2019 and showing an airway disaster evolving, are viewed by attendees using screen sharing followed by an interactive virtual discussion led by the facilitator. This allows demonstration of human factor principles, non-technical and technical skills, and discussion of strategies to improve these, without the need for manikins, actors, or simulation equipment (Saunders T, personal communication, 2021). These films are freely available,³³ and this teaching method could be easily replicated in other hospitals worldwide.

National strategies

The COVID-19 pandemic has witnessed rapid expansion in the use of technology for webinars, virtual airway workshops, and online conferences. The UK Association of Anaesthetists' first COVID-19 webinar was viewed by more than 29 000 individuals from 85 countries, dwarfing the attendance and increasing accessibility compared with its usual conferences. Internationally, more than 43 000 participants attended an International Airway Management Society <http://www.iamshq.com/> conferences have the advantages of reduced travelling time, cost, and environmental impact, and the opportunity to view the conference at a later date, enabling practitioners to participate in conferences that would otherwise have been impractical or unaffordable.

The RCoA piloted an interactive virtual airway workshop as an alternative to its usual face-to-face workshops, using short lectures and videos to demonstrate airway rescue techniques and complex airway procedures that may have been

performed infrequently during the pandemic. In contrast to the large meetings described, the number of delegates was kept intentionally small in an attempt to recreate the small group teaching available in a face-to-face workshop. The College of Anaesthesiologists of Ireland is trialling a similar hybrid model combining centrally delivered teaching in video and lecture form with local hands-on experience (O'Sullivan E, personal communication, 2021).

Two new airway Massive Open Online Courses were launched in 2020: '#airwaymatters'³⁴ with more than 25 000 learners from 164 countries, and DAS/RCoA Teaching Material for the Novice Anaesthetist, created especially for airway training during the COVID-19 pandemic and based on the concept of 'simulation-based mastery learning'.³⁵ Social media platforms are widely used by professional bodies and journals to allow easy access to and rapid dissemination of newly published papers, protocols, and guidelines, and enable sharing of experiences, ideas, and learning amongst practitioners around the world.

In summary, airway training opportunities for all anaesthetists have greatly changed during the pandemic, but this does not mean that airway training cannot be delivered. As the American author Napoleon Hill said, 'in every adversity lies the seed of an equal or greater opportunity'. It is possible that, by embracing novel concepts and maximising all airway training opportunities, many aspects of airway training may even be improved.

Authors' contributions

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