THE ASIA-PACIFIC SCHOLAR
MEDICAL AND HEALTH PROFESSIONS EDUCATION

CASE STUDY

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Submitted: 12 April 2022
Accepted: 19 August 2022
Published online: 3 January, TAPS 2023, 8(1), 57-60
https://doi.org/10.29060/TAPS.2023-8-1/CS2791

# Difficult airway training for anaesthetists and airway providers during a pandemic

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## I. INTRODUCTION

Airway management is critical for any anaesthetist. The Coronavirus Disease 2019 (COVID-19) pandemic has brought such skills to the forefront over the last three years. Yet, the outbreak has also disrupted traditional methods of airway skills training and limited the chances of in-person workshops and conferences due to social distancing requirements and demanding manpower needs. To lower the incidence of airway-related morbidity (Joffe et al., 2019), regular and effective instructional methods are needed to maintain airway providers' skills.

Our Department of Anaesthesia at the National University Hospital (NUH) of Singapore shares our experience conducting small-group refresher sessions, and how that has changed during a pandemic.

## II. ASSESSMENT OF CURRENT LEARNING PROGRAMME AND TRAINING NEEDS

Since 2013, our department has been conducting quarter-yearly intra-departmental mini-workshops for airway training. This was to address the airway component of our patient safety strategy, and the unmet need to maintain and upskill airway management techniques for as many anaesthesia providers as possible, who come with an uneven range of seniority and experience with difficult airways. We were challenged to achieve this goal, yet without overly impacting manpower and daily operations. Each session was led by in-house faculty and was open to anaesthesia providers of every level. On occasion, external faculty were invited if they had specific expertise in certain aspects. The syllabus aligned with Difficult Airway Guidelines (Rosenblatt & Yanez, 2022) and was done in a sequential, repeating manner.

## III. INTERVENTION: REFRESHER WORKSHOPS IN THE PANDEMIC

As the COVID pandemic came to Singapore around early 2020, our department training was disrupted in many ways. Nationwide social-distancing measures meant that in-person teachings and elective operations were suspended. The increased patient load from the pandemic also meant more manpower redeployed to the frontlines and Intensive Care Units, with an increased focus on infection control and personal protection. In the event airway intervention was required for a patient, the procedure carried significant risks from the aerosol-generating procedures of intubation and mechanical ventilation to both staff and patients. As a result, clinical exposure for airway providers-in-training was severely hampered.

Hence, alterations were made to our existing regular airway training regime. The didactic segment was smoothly transitioned to the videoconferencing platform, Zoom. This had the added benefit of widening the audience to providers who would otherwise have not been able to physically attend. We continued with the hands-on component of the session, but limited participants in the room at any one time in accordance with the room size, ensuring at least one meter between personnel. Strict personal protection was adhered to,

requiring all participants to wear N95 masks and perform hand hygiene before and after each station. Participants also assisted in maintaining the cleanliness of the equipment by using Isopropyl Alcohol 70% wipes to decontaminate all surfaces after use. Given the restricted participant size, a call-back system was used when participants had to be turned away. Attendance was tracked using a manual sign-in system. There were no incidences of transmission of COVID-19 because of these workshops.

We focused on airway management while wearing Personal Protective Equipment to better simulate clinical scenarios, bearing in mind the extra physical and cognitive load that airway providers bear in such circumstances (Foong et al., 2020). Specific skills such as how to safely transfer an intubated patient from one ventilator to another were also practiced and video laryngoscope intubation with a limited field of vision. Figure 1 outlines the suggested format, syllabus, and rationale of our mini-workshops, with the intent that it can be modified as needed and replicated in institution-specific settings.

**Suggested mini-workshop schedule and set-up**

| Timing | Activity | Purpose and aims |
|---|---|---|
| **Pre-event** | Dissemination and preparation | • Make known the date and time of the planned teaching schedule via electronic mail and internal messaging system.<br>• Invite interdisciplinary colleagues who may benefit from the same skillset. (e.g., Emergency and Respiratory Medicine colleagues)<br>• Set-up of hands-on stations and equipment.<br>• Manpower resources: Ratio of 1 faculty to approximately 20 participants who come at staggered small groups of 3-5 pax. |
| **First 30-45 minutes** | Didactic sharing (telecasted or in-person) | • Share updates about Difficult Airway Guidelines, evidence, advancements, or new equipment.<br>• Case sharing of difficult airways encountered by our own faculty.<br>• Demonstration of the technique of focus for that session. |
| **Subsequent 4 hours** (No time extension was required during pandemic isolation measures as the format was already suitable and efficient for small, staggered groups) | Hands-on practice | • Guided application of practice of the technique of focus.<br>• The equipment and facilitators were available for up to four hours from the start of the session to allow participants to return and practice whenever their elective surgical lists allowed. This intercalates the need for training a broad group of staff against daily operational and manpower needs.<br>• Assessment (optional) formats, bearing in mind that the key is to keep these workshops accessible to both senior and junior personnel, and avoid perceptions of stress due to assessment:<br>o Performance of technique of focus by participant and on the spot review by faculty.<br>o Quiz, poll or clinical scenario question.<br>o Subjective feedback of knowledge and confidence. |
| **Post-event** | Outcome measures and follow-up. | • Gather feedback from key stakeholders.<br>• Review attendance to gauge interest and participation: Consistently above 60% of department population for our sessions.<br>• Plan for subsequent workshop.<br>• Continue conversations about potential collaborations and areas of interests. |

**Suggested syllabus, to be covered in a sequential, repeating manner.**

Rational for components of syllabus: to equip participants with the skills required to navigate difficult airway algorithms.

- Videolaryngoscopy – different types of videolaryngoscopes and techniques.
- Supraglottic Airways - as a rescue airway device or conduit for intubation.
- Front of Neck Access (FONA) - percutaneous cricothyroidotomy.
- Bronchoscopy – different types of bronchoscopes and awake bronchscopic intubation techniques.
- Jet ventilation – modalities and equipment, indications and potential complications.
- Lung isolation for one lung ventilation – double lumen tubes and bronchial blockers.
- Airway crisis simulation – may be carried out in combination with any of the other components.
- Difficult airway management with Personal Protective Equipment* (Foong et al.,2020; Cook et al.,2020)

Figure 1. Suggested template and syllabus of in-house refresher workshops

*added from 2020 onwards

## IV. EVALUATION OF INTERVENTION DURING THE PANDEMIC

After almost 10 years, we review our airway training refresher sessions, including its adaptation to the COVID pandemic.

Firstly, the sessions were logistically manageable, using pre-existing equipment and a realistic number of faculty. The intimate number of participants not only complied with safe distancing measures but also encouraged more detailed guidance and supervision of practical skills tailored to the participant's skill level. Flexibility in attendance allowed for continued participation without significantly affecting manpower during the ongoing pandemic.

Simulation-based mini-workshops allowed for continued honing of skills when authentic clinical scenarios were limited. While simulation is unable to replace the actual experience, it has a positive impact on healthcare systems and their patients during times of a pandemic (Santos et al., 2021). The equipment and techniques covered kept abreast of the latest developments and content was curated to help cope with the pandemic by facilitating familiarity and identification of otherwise unexpected problems in managing a COVID airway, prior to real-life encounters and emergent patient care situations. These measures ensure that such high-risk airways are handled in a safe, accurate, and swift manner, maximising first-pass success, and minimising risks to patients and airway providers in the actual situations (Cook et al., 2020).

The workshops were also able to touch on the softer skills required in airway management. The sessions catered to a mix of staff to build teamwork and coordination in a multidisciplinary airway crisis team. Having a shared plan and proper forms of communication are critical in crisis airway situations, even more so with the additional barrier of PPE. Our in-house training has received positive feedback in increasing staff confidence and preparedness for facing airway crises during times of the pandemic.

## V. CONCLUSION

As with any skill, practice is essential. During these times of a public health crisis, we need to be adaptable in our instructional methods of continuing training. We believe that our hands-on refresher sessions have been beneficial in enhancing the accessibility of airway management practice even during a pandemic and suggest a syllabus and method that can be replicated and modified to suit the needs and resources of various settings.

## Notes on Contributors

Caitlin Ng took lead in drafting and revising of the manuscript, along with aiding in data collection and analysis.

Leong Siaw May contributed to the conceptualisation of the study and revision of the manuscript and was faculty at some of these workshops.

Arumugam Rajesh Kannan contributed to the conceptualisation of the study and revision of the manuscript and was faculty at some of these workshops.

Deborah Khoo conceptualised of study, led the data collection, was faculty at some of these workshops, and contributed to the revision of the manuscript.


## Acknowledgement

Our team would like to thank the department of Anaesthesia, NUH, for the provision of equipment, participation, and facilitation of the faculty in the workshops. We were fortunate to have the equipment and facilities at our disposal to conduct such workshops at our convenience. We understand that this privilege may not be generalisable elsewhere.

## Funding

There was no funding received for this project, beyond that of the department's resources.


## Declaration of Interest

The authors report no conflict of interest.

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