

# Preparedness to combat COVID-19 via structured online training program regarding specific airway management: A prospective observational study

## INTRODUCTION

Coronavirus outbreak has increased the load of critically ill patients across the world and has overwhelmed the working capacity of frontline physicians.<sup>[1,2]</sup> Attaining adequate skills in these mandates not only technical proficiency but also clinical knowledge.<sup>[3]</sup> In a usual scenario, such training requires face-to-face educational presentations and dedicated skill stations for participants to have hands-on experience. However, considering the COVID-19 situation, with the risk of viral contamination during face-to-face training, online teaching has become a new norm for the educational training.<sup>[4,5]</sup> Web-based learning (WBL) is defined as the “usage of computers and networks in education,” including learning management systems, online tutorials, discussion forums, and objective structured clinical examinations (OSCE). Advantages of WBL include flexibility and access, improvement of other educational modalities, ease for content updating, and appeal for the current “tech-savvy” generation.<sup>[6,7]</sup> Thus, keeping the safety of health care workers at utmost priority, we designed a standardised online, interdisciplinary, interactive airway training course to increase the ability of critical and noncritical care health professionals in airway management of critically ill patients of COVID-19.

## METHODOLOGY

After obtaining institutional ethical approval, clinical health professionals including postgraduate and senior residents across all clinical specialties [Figure 1] were included over a period of 3 months in this prospective, observational study, conducted at a tertiary care institute.

Sample size calculation was based on nonprobability convenience sampling. For each training session, conducted thrice weekly, the participants’ list of 30 was prepared to take a homogeneous block sample from each clinical department. The participants who were unable to attend the programme due to ongoing

commitments or illness during the allotted time were excluded. The course content included teaching participants (using live audio-visual relay of lectures, power point presentations, enacting case scenarios, and video clips) regarding the pandemic situation, spread of COVID-19, risk-mitigation, protection of health care staff during airway procedures, identification of airway assessment predictors, teaching guidelines and plan for airway management, inventory of airway equipment (COVID intubation kit), concerning drugs, steps for video-laryngoscopy, intubation, supraglottic airway insertion, and front of neck access.

The skill station (1 h) included the video relay of a computer-based simulator mannequin, on which instructor performed the sequence of preparation of equipments and drugs, difficult airway assessment, plan of airway management, and demonstrated technique for placement of airway adjuncts, mask ventilation, intubation (using videolaryngoscopy), supraglottic airway device insertion, and cricothyroidotomy. Participants were allowed to clarify their doubts onto each section as many times as needed. A debriefing session was carried out after each scenario, followed by an analytical phase in which the trainee summarised the merits and demerits of the scenarios.

The participants were assessed with an identical “pre and post-test questionnaire” sent via “google forms,”

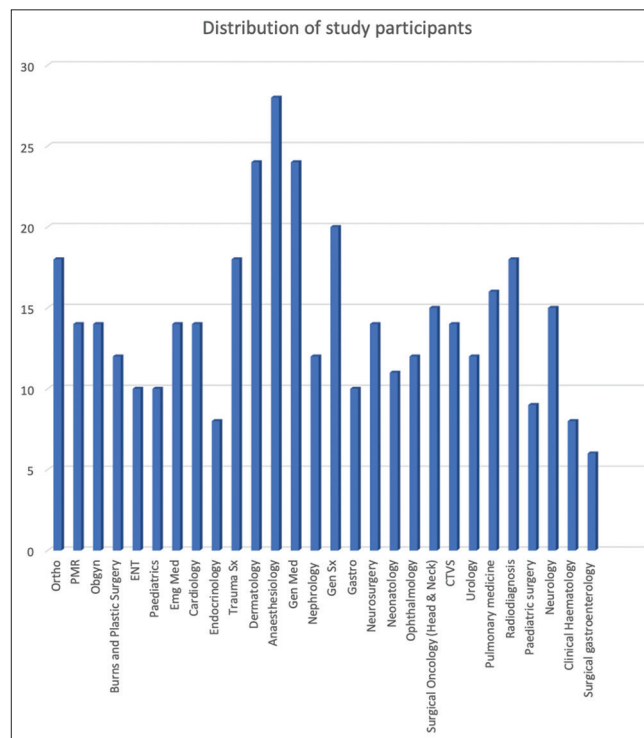


Figure 1: Distribution of study population (residents from different specialties)

which consisted of 20 multiple-choice questions, including case scenarios, airway examination-related video clips, and images of the airway equipment validated by two experienced faculties expert in the field of airway. They were also required to answer 10 OSCE-based questions, evaluated by two experienced instructors. It was mandatory to attend the full training program with 75% marks in each post-test questionnaire and OSCE, for the successful completion of course. The participants who failed to achieve the said score were asked to repeat the training. A feedback form was provided to the participants at the end consisting of eight assertions with a five-point Likert scale rating. Two faculty members with expertise in airway management independently validated the questionnaire and survey form. An investigator blinded to study protocols collected and analysed the outcome data. The statistical analysis was performed with Statistical Package for the Social Sciences version 23.0 software (SPSS, IBM Corp. Armonk, NY, US).

## RESULTS

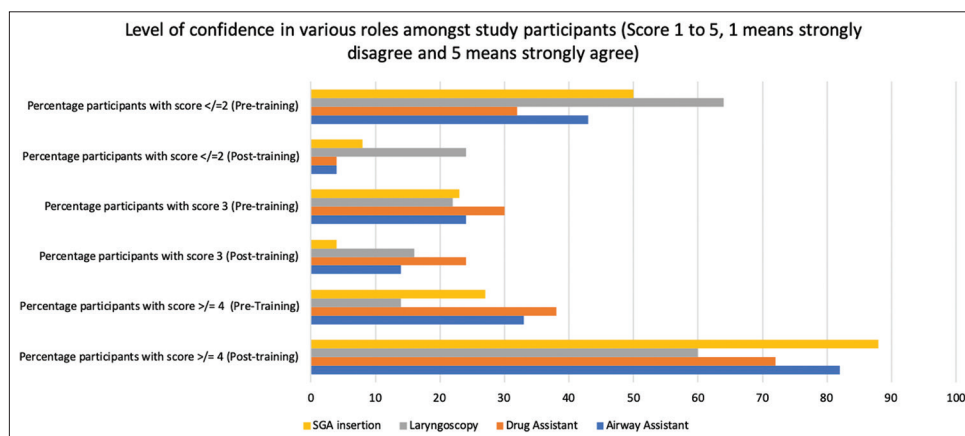
In total, we trained 530 participants during consecutive sessions. Typically, 130 participants who did not complete either/both pretest and post-test were considered drop-outs and excluded from analysis. In the evaluated pretests, mean score was  $9.62 \pm 2.47$ , and the post-tests mean score was  $15.80 \pm 3.54$ , with a statistically significant difference ( $p$ -value  $< 0.001$ ). The post-session OSCE-based assessment also showed statistically significant improvement (mean score of  $8.2 \pm 0.6$  v/s  $5.1 \pm 0.4$ ). Most participants were able to answer basic questions related to indications of intubation, personnel protective equipment (PPE), and aerosol-generating procedures. Frequently missed questions (questions with less than 50% response)

in the pretest were based on specific knowledge of airway assessment, rapid sequence induction, and airway management plans. There was significant improvement ( $p$ -value  $< 0.0005$ ) in overall knowledge and awareness regarding airway management in COVID patients [Figure 2]. Majority of residents were not acquainted with the concept of team dynamics and could not identify the allocation of roles of intubator, airway assistant, and drug manager in the pretest, but 96% participants correctly answered these questions after the session.

The feedback survey from participants after the course completion suggested that 79% participants agreed and 8.1% strongly agreed that they were familiar with airway management [Figure 2]. Typically, 74% participants were fearful of managing airway in a COVID patient for the fear of aerosol production, PPE breach, lack of hands-on experience, difficult airway situation, lack of confidence, and cross infection. Most residents found short-term online format of airway training useful and believed that it would improve their clinical skill and knowledge.

## DISCUSSION

Preparation for the care of patients with COVID-19 demonstrated the need for the development of an effective training module over a limited time. During the Ebola outbreak of 2014, Phrampus *et al.* demonstrated the utility of online simulation-based teaching.<sup>[8]</sup> Pei *et al.* concluded in a systematic review that online learning for medical education might be more effective than offline learning.<sup>[9]</sup> Similar results were found by Cook *et al.* who compared no intervention with technology-enhanced simulation training in health professionals' education.<sup>[10]</sup>



**Figure 2:** Level of confidence in various roles amongst study participants (Score 1 to 5, 1 means strongly disagree and 5 means strongly agree)

Studies have shown that residents tend to exhibit training-induced cognitive bias, implying they will preferentially choose a technique for which they received formal instruction. Successful airway management requires team collaboration and implementation of the correct plan of action and familiarise our residents with the correct airway management protocol.<sup>[11]</sup> Tracheal intubation itself is a high aerosol-generating procedure and has been recommended to be performed by the most experienced personnel to maximise first pass success and reduce personal exposure.<sup>[12]</sup> In a national survey conducted on anaesthesiologists in Turkey, majority exhibited highly appropriate attitude, awareness, and knowledge toward COVID infected patients.<sup>[13]</sup>

Intubation is a skill that cannot be acquired overnight or through an online module. We thus aimed at teaching them airway equipment, medications required, teamwork, and correct plan of action, rather than making them expert airway managers online. This helped in preparing them to work confidently as a team, co-ordinate, play the role of an airway assistant, drug manager or even runner, and improve airway management in times of crisis.

Safety of health care providers is of utmost priority, and online training makes work training easier and safe both for the instructors and participants.<sup>[7]</sup> The major strength of our study is that we could cater to a large number of participants via online designed program in very less time, including those who were posted in COVID areas.

## CONCLUSION

This pandemic has highlighted the need for making basic airway training mandatory not only for anaesthesiologists but for all clinical specialties across the medical field. Our training module helped in filling-up gaps in the field of airway management and thus shaping better and more efficient health-care providers. We were able to effectively train our residents and strengthen our workforce further. Our study is unique in its nature, which opens up new arenas for others to explore and inculcate our experience in their teaching programme to better equip themselves for the

pandemic and perform their responsibility towards the patients more efficiently.

## Acknowledgement

We would like to acknowledge and thank Dr. Shalinee Rao, Head, Advanced Center of Continuous Professional Development (CPD), Dr. Priyanka Gupta and Dr. Mridul Dhar, in Department of Anaesthesiology for their invaluable support rendered for smooth conduct of training module. We would also like to extend our thanks to Mr. Hemant Kumar and Mr. Arun, Department of Advanced Centre of CPD for helping us in smooth conduct of online sessions and correcting technical difficulties.

## Financial support and sponsorship

Nil.

## Conflicts of interest

There are no conflicts of interest.

**Bhavna Gupta, Gaurav Jain, Priyanka Mishra,  
Sharmishtha Pathak**

Departments of Anaesthesiology, AIIMS, Rishikesh,  
Uttarakhand, India

## Address for correspondence:

Dr. Sharmishtha Pathak,  
Department of Anaesthesiology, AIIMS, Rishikesh, Uttarakhand, India.  
E-mail: sharmishtha.pathak@gmail.com

**Submitted:** 26-May-2020

**Revised:** 14-Jul-2020

**Accepted:** 14-Aug-2020

**Published:** 01-Sep-2020

## REFERENCES

1. Cucinotta D, Vanelli M. WHO declares COVID-19 a pandemic. *Acta Biomed* 2020;91:157-60.
2. Ehrlich H, McKenney M, Elkbuli A. Protecting our healthcare workers during the COVID-19 pandemic. *Am J Emerg Med* 2020;38:1527-8.
3. Stringer KR, Bajenov S, Yentis SM. Training in airway management. *Anaesthesia* 2002;57:967-83.
4. Sajeva M. E-learning: Web-based education. *Curr Opin Anesthesiol* 2006;19:645-9.
5. World Health Organisation. Considerations in adjusting public health and social measures in the context of COVID-19. *World Heal Organ* 2020;1-7.
6. Hindle A, Cheng J, Thabane L, Wong A. Web-based learning for emergency airway management in anesthesia residency training. *Anesthesiol Res Pract* 2015;2015:971406. doi: 10.1155/2015/971406.
7. Jain G, Gupta B, Gupta P, Rao S. Online training for sensitization on airway and ventilatory management as preparedness to combat COVID situation. *Indian J Anaesth* 2020; Ahead of print.
8. Phrampus PE, O'Donnell JM, Farkas D, Abernethy D,

Brownlee K, Dongilli T, *et al.* Rapid development and deployment of Ebola readiness training across an academic health system: The critical role of simulation education, consulting, and systems integration. *Simul Healthc* 2016;11:82-8.

9. Pei L, Wu H. Does online learning work better than offline learning in undergraduate medical education? A systematic review and meta-analysis. *Med Educ Online* 2019;24:1666538. doi: 10.1080/10872981.2019.1666538.
10. Cook DA, Hatala R, Brydges R, Zendejas B, Szostek JH, Wang AT, *et al.* Technology-enhanced simulation for health professions education: A systematic review and meta-analysis. *JAMA* 2011;306:978-88.
11. Mouli T, Davuluri A, Vijaya S, Priyanka A, Mishra S. Effectiveness of simulation based teaching of ventilatory management among non-anaesthesiology residents to manage COVID 19 pandemic-A quasi experimental cross sectional pilot study. *Indian J Anaesth* 2020;64:136-40.
12. Price S, Singh S, Ledot S, Bianchi P, Hind M, Tavazzi G, *et al.* Respiratory management in severe acute respiratory syndrome coronavirus 2 infection. *Eur Hear J Acute Cardiovasc Care* 2020;7:204-6.
13. Dost B, Koksall E, Terzi Ö, Bilgin S, Ustun YB, Arslan HN. Attitudes of anesthesiology specialists and residents toward

patients infected with the novel coronavirus (COVID-19): A national survey study. *Surg Infect (Larchmt)* 2020;21:350-6.

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Access this article online	
Quick response code	Website: www.ijaweb.org
	DOI: 10.4103/ija.IJA_655_20

**How to cite this article:** Gupta B, Jain G, Mishra P, Pathak S. Preparedness to combat COVID-19 via structured online training program regarding specific airway management: A prospective observational study. *Indian J Anaesth* 2020;64:796-9.