Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

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COVID intubation team (CIT)– an experience at a tertiary UK centre

1. Introduction

After the World Health Organisation declared novel coronavirus disease 2019 (COVID19) as a pandemic [1], and, as of 23rd May 2020, there have been more than five million confirmed cases and over 350,000 COVID19 – related deaths reported worldwide. Patients who deteriorate despite supplemental oxygen/non-invasive ventilatory support measures should be considered for mechanical ventilation [2,3]. In the United Kingdom, 67% of patients admitted to an intensive care unit required advanced respiratory support [3]. Experience from other airborne viruses such as SARS and MERS suggest that airway interventions pose a high risk of viral transmission to humans [4]. Furthermore, tracheal intubation in a critically ill patient is considered a high-risk procedure with high mortality rates in COVID19 patients [5,6]. Therefore, it is recommended that the airway is managed by the most appropriate clinician in a dedicated airway team [7,8]. Laryngoscopy should be attempted with the device most likely to achieve first pass tracheal intubation in the operator's hand, preferably a videolaryngoscope [8,9].

2. Background

University Hospitals Birmingham is a large tertiary centre in the United Kingdom (UK) and has around 100 intensive care beds across four sites with an additional pandemic surge capacity of 150 beds. In line with Public Health England guidance to the National Health Service to prepare for a surge in the number of patients potentially needing mechanical ventilation, the anaesthetic department agreed to form dedicated COVID Intubation Teams for each hospital site from 17th March 2020. The CIT consisted of a Consultant Anaesthetist, a second Anaesthetist (Consultant, Trainee or Anaesthetic Associate), an Operating Department Practitioner, and a Runner who stayed away from the intubating area for emergency assistance. This was in line with the UK Department of Health recommendation for a Mobile Emergency Rapid Intubation Team (MERIT) [9] and to minimise exposure of staff to high risk areas. The team did not have doctors from any specialty other than anaesthesia. The CIT had a dedicated contact point, standardised airway trolleys containing prepacked airway grab bags, transfer ventilators, infusion pumps, monitors and premade drug bags [10,11]. The contents of the airway grab bags have been listed in Table 1. The CIT was resident and individual teams covered each site of the Trust. It was agreed that the Public Health England advice on full personal protective equipment (PPE) would be followed by all members of the team for every airway intervention. The primary remit of the team was to resuscitate identified patients, secure their airway and safely transfer them to critical care unit. However, CIT also aided the critical care team with transfers for essential imaging, insertion of invasive lines, change of tracheal tubes, proning of patients and helping with tracheostomy whenever feasible.

3. Methods

To monitor the experience of the CIT, an online data collection tool using Google Forms® was created. The questionnaire was completed by the lead Consultant, and included anonymised details of the retrieved patient, airway management details, use of PPE and the number of team members amongst others with space for feedback and suggestions.

4. Findings and discussion

As of 15th of April a total of 164 patients were intubated by the CIT at our institution for mechanical ventilation on the intensive care unit. The majority were in their fifth and sixth decade of life (n = 92). Airway assessment was carried out after receiving an alert and immediately prior to intubation. Further details collected included the location of intubation, grade of the primary intubator and the technique used (Table 2).

The laryngoscopic choice was primarily dictated by operator preference and availability. The videolaryngoscope available for use in the institution were C-MAC™ *(Karl Storz GmbH & Co. KG, Tuttlingen, Germany)* at the time of this review. 15L/min of oxygen through a tight-fitting mask and Mapleson C circuit was used for pre-oxygenation in all cases. The mean of the best oxygen saturations achieved after preoxygenation and after intubation were 93% (87–93%) and 94% (91–97%) respectively. However, marked but brief drops in saturations were observed after induction of anaesthesia in many patients as reported in the free text feedback. In our cohort, two patients had a cardiac arrest before induction of anaesthesia. All the intubations were done by either a Consultant (n = 152) or an experienced specialist doctor or a trainee (n = 12) under direct consultant supervision and all were successful in the first attempt.

There were no patients that required supraglottic airway device rescue or front of neck airway access. Because both direct and indirect video laryngoscopy were to be used, it was difficult to use Cormack-Lehane or POGO laryngoscopy scores. Instead we used a simplified intubation difficulty score ie, easy, intermediate (needing adjuncts like bougie or change in position after induction of anaesthesia), difficult (individual perception of the senior anaesthetist with explanation of why it was difficult) and Cannot Intubate Cannot Oxygenate situation.

Transfer to the intensive care unit was uneventful for all patients and was done by the whole CIT with the runner clearing the way.

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Table 1
Airway grab bags.

COVID 19 Advanced Airway Pack (Plan A)
Face mask x 1 (size 5)
Anaesthetic breathing system, 22mm Mapleson C breathing circuit x 1
Heat and moisture exchanging filter (HMEF) and catheter mount x 1
Capnograph line x 1
Macintosh laryngoscope size 4 x 1
15F bougie (70 cm) x 1
Cuffed endotracheal tubes x 2 (size 7 and size 8)
20 ml syringe x 1
Tube tie x 2
Lubricant sachets x 2
Mosquito artery forceps x 1
Tough cut scissors x 1
COVID 19 Rescue Airway Pack (Plan B)
I Gel x 3 (size 3, size 4 and size 5)
Lubricant sachets x 2
Oropharyngeal airway X 3 (size 2, 3 and 4)
Face mask x 2 (size 3 and size 4)
Tracheal stylet 4 mm x 1
COVID 19 CICO Airway Pack (Plan D)
Disposable number 10 scalpel blade with handle x 1
15F bougie (70 cm) x 1
Cuffed endotracheal tube x 1 (size 6)

Table 2
Key findings.

	N	%
Location of intubation		
Emergency Department	53	32%
Ward	103	63%
Operating Theatre	6	3.7%
Reintubations on ITU	2	1%
Grade of Intubator		
Consultant anaesthetist	152	93%
Specialty doctor	7	4%
Specialty trainee	4	2.4%
Core trainee	1	0.6%
Laryngoscopic technique		
Videolaryngoscope (Indirect)	77	47%
Direct laryngoscope	87	53%
Grade of intubation difficulty		
Easy	121	74%
Intermediate	28	17%
Difficult	15	9%

Full compliance with recommended PPE was observed during airway management and the transfer. This comprised of water-resistant gown, gloves, hat, goggles or visor and a disposable FFP3 mask *(3M, Minnesota, USA)*. Subsequently, seven members (all anaesthetists) out of 175 staff who participated in the CIT were tested positive for COVID 19 after being symptomatic. At the time of writing this review, only one amongst them needed hospital admission and humidified high flow nasal oxygen for COVID 19 symptoms.

Using the feedback from the CIT members, several processes were changed to further enhance the safety of airway management and transfers. This included the setting up a second backup airway trolley with a separate monitor, infusion pumps, and transfer ventilator. In line suctioning catheters were added to the portable ventilator circuits to aid safe suctioning of secretions. Emergency purchase orders for additional portable videolaryngoscopes – Disposable C-MAC™ *(Karl Storz GmbH & Co. KG, Tuttlingen, Germany)* and McGrath™MAC *(Medtronic Ltd, Watford, UK)* were made and logistical issues of transfer routes to the intensive care unit were corrected. The feedback from intensive care and emergency physicians about the CIT have been overwhelmingly positive and there is unanimous agreement that a dedicated and experienced airway team makes a huge difference in the resuscitation and safe airway management of a vulnerable and critically ill group of patients.

5. Limitations to the study

Our hospital has four different sites across Birmingham with access to only one model of videolaryngoscope across all sites at the time of this review. One of the sites had the videolaryngoscope introduced only in March 2020. A significant number of anaesthetists were not comfortable using such new equipment in an emergency and they preferred direct laryngoscopy.

We only collected data on the best pre and post intubation oxygen saturations. It was deemed impractical for the team to accurately remember and record the nadir of oxygen desaturation in a busy and rapidly changing clinical environment. The free text feedback suggested that the immediate post intubation saturations were often below 85%, which also makes the accuracy of any such readings questionable.

Whilst we can highlight that seven members of the CIT got subsequently unwell and tested positive for COVID 19 (RT-PCR test), it is impossible to suggest causality under the circumstances. At the beginning of the pandemic COVID 19 RT-PCR testing was only indicated for symptomatic cases in the UK. Therefore, it was not feasible to identify asymptomatic carriers during this study period. Furthermore, all members were returning home after their work shifts and had no mandatory isolation measures at home in place.

This study which was started during the early phase of COVID19 pandemic in the United Kingdom looked at the setting up and development of an intubation team for COVID19 airway management at a major tertiary hospital. Despite the limitations of the study, partly due to the evolving nature of the pandemic, our experience suggests that a dedicated senior team can improve the safety in the immediate management of this group of critically ill patients.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.tacc.2020.05.004.

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