Table 1 Time to intubate the trachea and success rate. Times are expressed as median [IQR] (range) in seconds. *P<0.05 compared with the Macintosh laryngoscope.

	Time to intubate the trachea	Success rate (%)	Median difference [95% CI for median difference]
Macintosh laryngoscope	27 [25, 31] (24–34)	100	-
Airwayscope® s-100	19 [18, 22] (15–39) *	100	-8 [-13, -3]
Airtraq® AVANT	30 [25, 41] (19–120)	85.7	3 [-5, 16]
Kingvision®	24 [21, 29] (14–40)	100	-3 [-11, 12]
McGrath®	20 [19, 22] (18–26) *	100	-7 [-12, -3]

into disinfectant solution. The blade of the Kingvison® is disposable, but its display cannot be immersed in liquid and thus can only be disinfected by an alcohol wipe.

In conclusion, our simulation study indicates that different videolaryngoscopes perform differently depending on the circumstances. Despite the small numbers, the Airwayscope® provided shorter intubation times compared with other laryngoscopes for tracheal intubation in simulation of patients with COVID-19.

Declarations of interest

TA is an editor of the *British Journal of Anaesthesia*; the other authors have no conflict of interest.

Acknowledgements

We thank the staff of the Department of Anesthesiology, Dokkyo Medical University Saitama Medical Centre, for their participation.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.bja.2020.06.002.

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doi: 10.1016/j.bja.2020.06.002
Advance Access Publication Date: 11 June 2020

Emergency tracheal intubation in patients with COVID-19: is it any different? Comment on *Br J Anaesth* 2020; 125: e28–e37

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DOI of original article: 10.1016/j.bja.2020.03.026.

Keywords: aerosol-generating procedure; airway management; COVID-19; hypotension; infection prevention; tracheal intubation

Editor—We read with interest the correspondence by Yao and colleagues[1] on emergency tracheal intubation in patients with coronavirus disease 2019 (COVID-19). We thank the authors for sharing their valuable experience in this constantly evolving crisis encompassing the globe, with guidelines on managing the disease being published daily. However, there are several interesting points in the article that we believe warrant further clarification.

The authors recommend the use of a fluid bolus as a strategy to combat haemodynamic compromise during tracheal intubation. However, at the same time, they acknowledge a lack of clear evidence regarding the efficacy of this intervention. Fluid management in patients with acute respiratory distress is an area of uncertainty. Competing priorities (e.g. hypoxaemia and arterial hypotension) co-exist, thereby making its management difficult. In an RCT (PrePARE), administration of an i.v. fluid bolus did not decrease the overall incidence of cardiovascular collapse during tracheal intubation in critically ill patients in comparison with no fluid bolus.[2] In the absence of the need for restoration of depleted intravascular volume, the recommendation is to minimise fluids.[3] Interestingly, no patients received a fluid bolus in the authors' cohort of patients. It would be helpful if the authors had clarified the evidence base or experience to support use of a fluid bolus despite not having implemented the strategy themselves.

There appears to have been considerable heterogeneity in practice between the two centres. Despite the presence of clinical parameters signifying impending haemodynamic compromise, there was no use of prophylactic vasopressors in Hospital B as opposed to nearly 30% in Hospital A. Despite this, there was only a slightly higher incidence of hypotension after intubation in Hospital B in comparison with Hospital A, which was not statistically significant. Considering this a comparison of a control group (no vasopressor) *vs* vasopressor administration, an inference can be drawn that administration of a vasopressor provided no advantage over the control group. We must therefore question the basis upon which the authors recommend prophylactic administration of a vasopressor before airway management in critically ill patients. Interestingly, propofol was the induction agent of choice for nearly all the patients. In light of the availability of etomidate, the near universal use of propofol in this critically ill group of patients (with a very high likelihood of haemodynamic compromise) is surprising.

Four patients suffered cardiac arrest during tracheal intubation. It would be interesting to know the underlying rhythm during these episodes, whether shockable or non-shockable. It would also be helpful to know whether cardiopulmonary resuscitation was required and what precautions were taken to avoid cross-contamination. Hypotension *per se* is a common occurrence during tracheal intubation in critically ill patients,[2] and severe hypotension can be misinterpreted as pulseless electrical activity in the absence of invasive haemodynamic monitoring. Management of both these conditions is different, as are the outcomes.

The low incidence of hypotension (7.9%) before securing the airway reflects timely intervention by the operators. However, nearly a quarter of the patients were tachycardic, implying underlying potentially significant haemodynamic derangement. However, we failed to understand the substantial number of unconscious patients (12.9%). Was it haemodynamic compromise leading to impaired cerebral perfusion, or were there any other contributory factors (with metabolic derangement) responsible?

Tracheal intubation was facilitated in all cases by 'modified' rapid sequence induction (RSI). Mask ventilation after induction was performed in the majority (93.1%) of patients. Historically, manual ventilation before tracheal intubation was considered an integral component of RSI.[4,5] Wylie[6] proposed the concept of 'not inflating' the patient's lungs with oxygen until tracheal intubation had been accomplished in 1963. This view was subsequently reinforced by Stevens[7] in 1964. Both these authors hypothesised that positive pressure ventilation before intubation increases the risk of gastric inflation and the potential for regurgitation.[6,7] Incorporation of these changes into practice led to the origin of the concept of 'modified' RSI. Thus, we believe that the authors performed 'traditional' RSI and not the 'modified' RSI technique.

Manual ventilation in this cohort of patients could be counterproductive for three reasons. Firstly, it might increase the risk for regurgitation and aspiration in patients who necessarily could not be ensured to be fasting. Secondly, the underlying condition was necessarily attributable to a shunt or ventilation–perfusion (VQ) mismatch. Administration of supplemental oxygen would not increase the arterial partial pressure of oxygen in the presence of a shunt or VQ mismatch. The operators had done their best by ensuring thorough preoxygenation with 100% oxygen in all patients. Bag-mask ventilation would not have contributed anything more to enhance oxygenation apart from losing critical time. Lastly, and most importantly, bag-mask ventilation is an aerosol-generating procedure.[8,9] In light of this, its use in the current context should consider the risk-benefit ratio, keeping in mind the safety of all operators involved. The same rationale applies to the high (70.8%) number of patients subjected to noninvasive ventilation. Given that noninvasive ventilation is also considered an aerosol-generating procedure,[9] we feel that restraint should have been exercised in its implementation in the current context. Protection of healthcare workers is not just about protective equipment; it encompasses all the principles of infection prevention and control.[10]

Declarations of interest

The authors declare that they have no conflicts of interest.

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doi: 10.1016/j.bja.2020.05.045
Advance Access Publication Date: 3 June 2020

Guiding airway management and personal protective equipment for COVID-19 intubation teams

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Keywords: airway management; COVID-19; personal protective equipment; protocol; simulation; tracheal intubation

Editor—Tracheal intubation of patients with coronavirus disease-19 (COVID-19) is a potentially aerosol-generating procedure that requires a careful yet efficient approach to ensure the safety of both patients and healthcare providers.[1] Faced with a rapidly escalating number of cases in New York City, the epicentre of the COVID-19 outbreak in the USA, our institution quickly created guidelines for the airway management of COVID-19 patients and an infrastructure to provide sufficient personal protective equipment (PPE) for intubating teams. Careful planning developing processes to ensure that PPE is readily available, creating standardised airway management protocols, and simulations and training of staff are crucial to ensure the safety of patients and healthcare workers.

Ensuring access to PPE

We developed an institutional protocol for use of PPE for intubations and a system to ensure our intubating teams had adequate supply. Our goal was to prevent situations in which providers had to choose between their safety and their ability to save patients' lives because adequate PPE was not readily available. With this in mind, we created 'COVID-19 bags' (Table 1) containing sufficient PPE for two providers to bring to intubations. Our goals were for PPE to (i) be easily transported by intubating teams, (ii) carry a low risk of self-contamination during doffing, and (iii) be in accordance with the Centers for Disease Control and Prevention PPE recommendations for aerosol-generating procedures in COVID-19 patients.[2]

Guidelines for tracheal intubation

Our guidelines are based on reports from the severe acute respiratory syndrome coronavirus 1 outbreak and recommendations from the Anesthesia Patient Safety Foundation.[3–5] The main objective is to reduce the risk of aerosolisation during intubation by.

(i) rapid sequence intubation and avoidance of bag-mask ventilation, if possible;
(ii) use of videolaryngoscopy to increase the distance from the patient's airway and the chance of success during first attempt;
(iii) immediate inflation of the tracheal tube cuff and connection to the ventilatory circuit, thereby avoiding manual ventilation;