BJA

British Journal of Anaesthesia, xxx (xxx): xxx (xxxx)

doi: 10.1016/j.bja.2020.04.058
Advance Access Publication Date: xxx
Editorial

EDITORIAL

The Wuhan COVID-19 intubation experience

Michael F. Aziz

Oregon Health & Science University, Portland, OR, USA

E-mail: azizm@ohsu.edu

Keywords: airway management; airway response team; COVID-19; infection prevention; personal protective equipment; tracheal intubation

This coronavirus disease 2019 (COVID-19) pandemic has grappled the world. The severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) causing the disease has proved quite contagious and deadly. Confusion and anxiety have consumed healthcare providers as we plan for surges or actively manage the high demand. Nearly 3 million people have been infected and mortality has approached 200 000.[1] Anaesthesiologists have taken a central role in perioperative operations and critical care.[2] Our experience is needed at the table as we make difficult decisions moving forward. Central to our role is our expertise as airway providers. Herein lies the fear. A critically ill patient potentially succumbing to the disease in our hands is now shedding their maximal viral load. Both the patient and provider are at a risk that has not been seen to this severity and scale in our field. The city of Wuhan in the Hubei province of China was the first to experience this pandemic and is now sharing their experiences in the literature. In this issue of the *British Journal of Anaesthesia*, Yao and colleagues[3] describe their process for intubation, personal protective equipment (PPE) interventions, intubation performance, and complications. We now have several important insights that we can learn from.

It is apparent that a dedicated airway response team was formulated. Amongst the two hospitals reporting data, a team of 52 anaesthesiologists handled all intubations. These highly skilled providers were best equipped to perform intubation and allowed for focused training of important practice pathways including anaesthetic management, a PPE plan, and intubation approach. Other centres would be prudent to model this approach because it appeared to work well while other observations make important calls for practice change. Several of those findings are reflected upon below.

Their PPE strategy was robust. An inner and outer gown with double gloving provided contact precautions and an additional barrier during doffing procedures. All providers wore an N-95 or equivalent respirator and a standard surgical mask, in addition to a powered air-purifying respirator or a hood. While the hood does not provide airborne protection itself, it serves as an additional contact barrier. However, their experience with the hood is noteworthy because 80% of those intubators reported fogging of the shield, which significantly impairs visualisation during laryngoscopy. The teams further protected themselves by utilising the services of a spotter who observed their donning and doffing practices to ensure quality control. Several reports in press in this journal describe PPE practice from other institutions that may serve to formulate local PPE plans.[4–6]

The team took another important step to protect their anaesthesiologists that may not be utilised in much of the world. They were quarantined in a private hotel for 14 days with monitoring of symptoms and required testing for COVID-19 even if asymptomatic. This step provided some likely needed rest for the team and further reduced the risk that this team would contract disease from the community or the hospital itself. Ultimately, none of these 52 anaesthesiologists contracted disease. So, it appears that their process worked to protect their providers. It remains unknown what the risk of providers contracting COVID-19 is. Reports from Northern Italy indicate that at least 4824 healthcare workers have contracted disease, which is quite alarming.[7] It is also not known if this infection is caused from engagement in such high-risk activity or from community interaction. This important question stands to be addressed by an ongoing study of providers conducting airway management for COVID-19 (or suspect) patients. The IntubateCOVID research group is an

international registry aimed at determining the disease contraction rate of intubating providers and is open across many nations for provider registration.[8] In a short time span, more than 4000 intubations have already been registered in this database (Neuman M, personal communication, 2020). We will soon have a better understanding if the isolation and robust PPE steps taken by these Wuhan hospitals are practiced by others and what the associated infection rate is amongst various practices and PPE interventions across the world.

The 202 intubations were performed with a remarkably high success rate. The first attempt success rate was 89% and 100% of patients were successfully intubated without the need for rescue surgical airway management. Many patients had clear anatomic indicators of difficult laryngoscopy. Most were intubated with the use of videolaryngoscopy which may add some distance from the provider to the patient and offer protection. The use of videolaryngoscopy may have also served to optimise success. Clinical trials to date have demonstrated mixed results regarding the benefit of videolaryngoscopy over direct laryngoscopy for tracheal intubation in critical care settings.[9] However, the success rate achieved in this study exceeds that observed in other studies when utilising either direct or videolaryngoscopy. It appears that the COVID-19 patient may not be any more difficult to intubate than other critically ill patients with respiratory failure, which is an important finding because of the fear that an associated cytokine storm[10] might cause airway oedema. Ultimately, I believe that the most important intervention was the application of a highly skilled intubation team who used tools that they were most comfortable with and recognised that physiologic features of difficult airway management are perhaps as important as the anatomic features.[11]

The complications observed during airway management offer some needed reflection. While the 24 h mortality rate of 10% appears high, the longer-term mortality rate of critically ill COVID-19 patients is known to be 49%[12] and even higher (86%) after tracheal intubation.[13]

More than 80% of the patients in this series had been bridged with noninvasive ventilation indicating advanced progression of their disease. It is apparent that many of these patients may have simply been intubated late in their disease progression, as reflected by pre-intubation hypoxaemia. Subsequently, 73% of patients suffered hypoxaemia during airway management. Debate exists regarding the use of high-flow nasal oxygen therapies or noninvasive ventilation for concerns of aerosolisation of the virus, so it is commonly not recommended.[14] Therefore, these authors and many others have come to a reasonable conclusion that it is best to intubate earlier in the disease progression. The authors also observed a high rate of pneumothorax (5.9%) after intubation. Pneumothorax is known to occur at higher rates in patients with acute respiratory distress syndromes (ARDS).[15] The study group anecdotally observed that it occurred less frequently in patients who were positioned prone early after intubation. Prone positioning is not new to ARDS management, but these data suggest that it may be particularly useful in this COVID-19 disease state, and this practice has been endorsed for COVID-19 patients with moderate to severe ARDS.[16]

In conclusion, we now know that COVID-19 patients can be intubated with a high success rate by utilising a highly skilled team, and that provider protection can be optimised with a robust PPE implementation process and provider isolation. We stand to learn a lot more about the intubation practice of COVID-19 patients as the rest of the world shares their experience. We will be better prepared for the next pandemic because of this information dissemination than we had from previous diseases. While we mourn the losses across the world, we take some comfort that we share this experience together and help each other provide the best clinical care. Thank you for sharing your experiences, Wuhan.

Declaration of interest

The author is member of the associate editorial board of the *British Journal of Anaesthesia*.

References

1. *Center JHUMCR* 2020. Available from: https://coronavirus.jhu.edu/. [Accessed 25 April 2020]
2. Yang M, Dong H, Lu Z. Role of anaesthesiologists during the COVID-19 outbreak in China. *Br J Anaesth Adv Access* April 10 2020. https://doi.org/10.1016/j.bja.2020.03.022
3. Yao W, Wang T, Jiang B, et al. Emergency tracheal intubation in 202 patients with COVD-19 in Wuhan, China: lessons learnt and international expert recommendations. *Br J Anaesth Adv Access* April 10 2020. https://doi.org/10.1016/j.bja.2020.03.026 [update] in this issue
4. Yong PS, Chen X. Reducing droplet spread during airway manipulation: lessons from COVID-19 pandemic in Singapore. *Br J Anaesth* 2020 Apr 15
5. Chen Q, Lim B, Ong S, Wong WY, Kong Y-C. *Rapid ramp-up of powered air-purifying respirator (PAPR) training for infection prevention and control during the COVID-19 pandemic. publication stage* April 15 2020. In press accepted manuscript
6. Odor PM, Neun M, Bampoe S, et al. *Anaesthesia and COVID-19: infection control* April 8 2020. Publication stage: in press corrected proof. Published online:
7. Anelli F, Leoni G, Monaco R, et al. *Italian doctors call for protecting healthcare workers and boosting community surveillance during covid-19 outbreak* 2020. p. 368 [update]
8. *IntubateCOVID* 2020. https://intubatecovid.knack.com/registry#add-intubation/. [Accessed 6 April 2020]
9. Arulkumaran N, Lowe J, Ions R, Mendoza M, Bennett V, Dunser M. Videolaryngoscopy versus direct laryngoscopy for emergency orotracheal intubation outside the operating room: a systematic review and meta-analysis. *Br J Anaesth* 2018; **120**: 712–24
10. Mehta P, McAuley DF, Brown M, Sanchez E, Tattersall RS, Manson JJ. COVID-19: consider cytokine storm syndromes and immunosuppression. *Lancet* 2020; **395**: 1033–4
11. Mosier JM. Physiologically difficult airway in critically ill patients: winning the race between haemoglobin desaturation and tracheal intubation. *B Br J Anaesth* 2019; **S0007–0912**: 30931–6
12. Wu Z, McGoogan JM. Characteristics of and important lessons from the coronavirus disease 2019 (COVID-19) outbreak in China: summary of a report of 72 314 cases from the Chinese Center for Disease Control and Prevention. *JAMA* 2020
13. Yang X, Yu Y, Xu J, et al. Clinical course and outcomes of critically ill patients with SARS-CoV-2 pneumonia in Wuhan, China: a single-centered, retrospective, observational study. *Lancet Respir Med* 2020

14. Cheung JC-H, Ho LT, Cheng JV, Cham EYK, Lam KN. Staff safety during emergency airway management for COVID-19 in Hong Kong. *Lancet Respir Med* 2020; **8**: e19
15. Miller MP, Sagy M. Pressure characteristics of mechanical ventilation and incidence of pneumothorax before and after the implementation of protective lung strategies in the management of pediatric patients with severe ARDS. *Chest* 2008; **134**: 969–73
16. Alhazzani W, Møller MH, Arabi YM, et al. Surviving Sepsis Campaign: guidelines on the management of critically ill adults with Coronavirus Disease 2019 (COVID-19). *Intensive Care Med* 2020: 1–34