(19%) in an operating theatre. Patients' COVID-19 status and laryngoscopists' health are reported in Table 1. WHO standard PPE was available for all intubations and was used in 70 (97%) cases.

The absence of laryngoscopist illness in our service evaluation differs from the 10.7% incidence reported by El-Boghdadly et al. [1]. The potential reasons for this difference are: improved availability of PPE; reduced risk of selection bias; and a shorter follow-up period. El-Boghdadly et al. reported use of WHO standard PPE [3] in only 87.9% of cases and the level of training in the use of PPE is not reported [1]. A risk of the non-mandatory self-reporting method of El-Boghdadly et al. is the potential for reporting bias; that is, laryngoscopists who developed symptoms might have been more likely to self-report, leading to an overestimation of the incidence. In 99% of cases, the incubation period for COVID-19 is 14 days or less [4]. The use of a longer follow-up period by El-Boghdadly et al. (40 days) [1] may also have led to an overestimation, due to unrelated acquisition of COVID-19.

In summary, El-Boghdadly et al. highlight the potential risk of intubating COVID-19 patients, whereas our service evaluation demonstrates that effective procurement, usage and decontamination of WHO standard PPE can reduce this risk. If elective surgery is to be re-established whereas COVID-19 is prevalent, the focus on effective PPE must be maintained in order to minimise the risk of COVID-19 transmission to healthcare workers.

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## References

1. El-Boghdadly K, Wong DJN, Owen R, et al. Risks to healthcare workers following tracheal intubation of patients with COVID-19: a prospective international multicentre cohort study. *Anaesthesia* 2020; **75**: 1437–47.
2. BBC News. *Coronavirus: UK deaths related to virus rise to 10*. 12 March 2020. https://www.bbc.co.uk/news/uk-51845861 (accessed 22/06/2020).
3. World Health Organization. Rational use of personal protective equipment for coronavirus disease (COVID-19) and considerations during severe shortages: interim guidance. 2020. https://apps.who.int/iris/handle/10665/331695 (accessed 15/06/2020).
4. Lauer SA, Grantz KH, Bi Q, et al. The incubation period of coronavirus disease 2019 (COVID-19) from publicly reported confirmed cases: estimation and application. *Annals of Internal Medicine* 2020; **172**: 577–82.

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# Tracheal intubation of patients with COVID-19: global risks

We thank Mullington et al. for sharing their local data [1] in response to our data from the intubate COVID study [2]. We applaud the success of their local policies and the low rate of reported COVID-19 outcomes in healthcare workers undertaking tracheal intubation. We are also grateful to all colleagues at Mullington et al.'s institution, as we have received data from 82 tracheal intubation episodes on our registry, and thus our analysis included more intubation episodes than referred to in their letter.

We wish to highlight some considerations when interpreting the letter and our study. First, direct comparisons with our data are challenging. For example, Mullington et al. state an inclusion criterion of "*absence of a negative COVID-19 ribonucleic acid polymerase chain reaction (RNA-PCR) test*", but 17 (24%) of their patients had a negative test and should perhaps have not been included in their analysis. This was in contrast to our methodology which only sought patients with suspected or confirmed COVID-19, and thus the proportion of patients with COVID-19 in our study was likely to be greater. Moreover, the indication for tracheal intubation in our respective studies differed, as only 47% of patients in the report by Mullington et al. required tracheal intubation for hypoxia, in contrast to 67% who required tracheal intubation for respiratory failure in our data. Further, we included data from both intubators and assistants, but Mullington et al. only presented data for intubating clinicians.

Second, Mullington et al. conducted a single-centre study of 72 healthcare workers, whose baseline characteristics were unknown. Whereas this is important and of local relevance, single-centre data might have limited generalisability when compared with larger datasets, and thus caution must be expressed when

 

interpreting these data. Zero events from 72 subjects are statistically compatible with a range of uncertainty of 0 to approximately 5%, using a two-sided 95%CI for proportions. Additionally, each intubator appears to have had approximately one intubation episode in their data, compared with a median (IQR [range]) of 2 (1–3 [1–42]) in our database, thus healthcare workers from our sample may have had more overall exposure to COVID-19. Furthermore, the data reported in the intubateCOVID study provides a global perspective, with data from 1718 participants and 5148 intubations in 17 different countries, and this should be considered when interpreting the findings. Notably, Mullington et al. state there were 72 patients intubated [1], despite Table 1 in their letter suggesting there were 79 tracheal intubation episodes and patients; thus the denominator for their analysis is unclear.

Third, Mullington et al. highlighted there was a risk of selection bias in our data analyses [1]. We did acknowledge the pitfalls of voluntary self-reported data; however, as ours was prospective in nature, collecting contemporaneous data, as well as the fact that we had nearly 80% of participants reporting their COVID-19 status after tracheal intubation, this is unlikely to have led to significant over-reporting. Indeed, were one to assume that all participants who did not report a follow-up outcome had no evidence of COVID-19 (n = 464) [2], the incidence of our primary endpoint would still be 8.4%.

Finally, the interpretation of Mullington et al. that their low rates were potentially due to improved availability of personal protective equipment (PPE) and robust infection control and decontamination policies is highly speculative. Beyond just the availability of PPE and policies and procedures comes the practical use of PPE, which is challenging to report. Adequate donning, doffing and appropriate decontamination procedures are not captured in either study and thus the implications of local availability of PPE and infection control policies must be very cautiously interpreted.

However, we do agree with Mullington et al. that our study, as with all studies, has limitations. These are stated within the manuscript itself, but we believe readers should be fully aware of these limitations, and thus we thank Mullington et al. for highlighting them. In particular, over-interpretation of our results must be avoided, and our discussion reflects this [2].

In conclusion, one cannot draw direct comparisons between the data reported by Mullington et al. and that of the intubateCOVID study thus far [1,2], and in this setting, in particular, we discourage the use of single-centre data to draw generalisable interpretations. However, we thank them for their reporting of these interesting data and believe all institutions should aspire to have outcomes similar to those they have reported.

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## References

1. Mullington CJ, Shetty P, Dalton J. Intubation of COVID patients: always a risky business? *Anaesthesia* 2021; **76** (Suppl 3): 3–4.
2. El-Boghdadly K, Wong DJN, Owen R, et al. Risks to healthcare workers following tracheal intubation of patients with COVID-19: a prospective international multicentre cohort study. *Anaesthesia* 2020; **75**: 1437–47.

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