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General correspondence

Fighting a pandemic with mechanical ventilators

With no proven pharmacotherapy or effective vaccine for COVID-19, several lay and medical publications have focussed on mechanical ventilation as a key intervention in the management of viral pneumonia from severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2).^{1–3} These publications have advocated for healthcare systems to acquire ventilators to manage cases with SARS-CoV-2. Despite availability, the initiation of ventilation should be judicious due to significant mortality and morbidity in mechanically ventilated patients with SARS-CoV-2.

The World Health Organization estimates that serious illness may occur in as many as 13.8% of cases with 6.1% likely to require critical care.⁴ Several countries have increased their capacity to ventilate patients with COVID-19 complicated by severe respiratory failure in the belief that ventilation is effective treatment,¹ thus reassuring the public and policy makers. However, severe respiratory failure caused by COVID-19 differs from other viruses, with publications confirming intensive care unit (ICU) admission occurred in 7–26% of

hospitalised patients with COVID-19^{5,6}. In patients requiring ICU admission, COVID-19 patients were more likely to require mechanical invasive and prolonged ventilation⁷ with an ICU mortality currently reported between 49% and 88%^{5,8,9}. This high mortality is likely attributed to the timing, dose and duration of many therapies or life support for COVID-19 that remain controversial. Furthermore, many survivors of critical illness do not return to their baseline functional status with post ICU psychosis and a reduction in health-related quality of life.¹⁰ The morbidity in COVID-19 patients post ICU survival is unknown but is likely to be high.


Mechanical ventilation administered in purpose built ICU by experienced physicians and nurses is an effective intervention for selected patients with acute respiratory failure. Some ventilated patients may require renal replacement therapy and extracorporeal membrane oxygenation that will further increase the complexity of care. It is often problematic if not impossible to provide such high-quality care during a pandemic when healthcare systems are strained. The intensive care community has raised concerns when pandemic plans include expanding critical care provision in non-critical care environments,

staffed by insufficient, inadequately trained staff. Such measures may not replicate the care in appropriately staffed and equipped ICU, with the implications reflected in patient outcomes. The temporising measure of ventilating a patient with viral pneumonia is not comparable to a vaccine, antiviral or antibiotic agent that is potentially curative. Intensive care and mechanical ventilation are merely supportive, serving as the last intervention for patients at high risk of deterioration and potential death.

COVID-19 patients admitted to intensive care currently have a high mortality and are likely to have significant residual morbidity, should they survive. Mechanical

ventilation for respiratory failure attributed to COVID-19 should be carefully considered and deployed in environments that optimise patient outcomes and minimise the risk to health care workers. Supportive therapy has never been a panacea during a pandemic and the mechanical ventilator is unlikely to change history.

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Ravindranath Tiruvoipati ^{1,2} and John Botha^{1,2}

¹Department of Intensive Care Medicine, Frankston Hospital, and

²Faculty of Medicine, Nursing and Health Sciences, Monash University, Melbourne, Victoria, Australia

References

- 1 Ventilators Explained: Key Device in Fight Against Coronavirus. 2020 [cited 2020 Apr]. Available from URL: <https://www.aljazeera.com/news/2020/03/ventilators-explained-key-device-fight-coronavirus-200329065155185.html>
- 2 Rosenthal BM, Pinkowski J, Goldstein J. 'The Other Option Is Death': New York Starts Sharing of Ventilators. 2020 [cited 2020 Apr]. Available from URL: <https://www.nytimes.com/2020/03/26/health/coronavirus-ventilator-sharing.html>
- 3 Farkas J. PulmCrit – Splitting Ventilators to Provide Titrated Support to a Large Group of Patients. 2020 [cited 2020 Apr]. Available from URL: <https://emcrit.org/pulmcrit/split-ventilators/>
- 4 Report of the WHO-China Joint Mission on Coronavirus Disease 2019 (COVID-19). 2020 [cited 2020 Apr]. Available from URL: <https://www.who.int/docs/default-source/coronaviruse/who-china-joint-mission-on-covid-19-final-report.pdf>
- 5 Yang X, Yu Y, Xu J, Shu H, Xia J, Liu H *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; **8**: 475–81.
- 6 Wang D, Hu B, Hu C, Zhu F, Liu X, Zhang J *et al*. Clinical characteristics of 138 hospitalized patients with 2019 novel coronavirus-infected pneumonia in Wuhan, China. *JAMA* 2020; **323**: 1061.
- 7 Tolksdorf K, Buda S, Schuler E, Wieler LH, Haas W. Influenza-associated pneumonia as reference to assess seriousness of coronavirus disease (COVID-19). *Euro Surveill* 2020; **25**: 2000258.
- 8 Wu Z, McGoogan JM. Characteristics of and important lessons from the coronavirus disease 2019 (COVID-19) outbreak in China: summary of a report of 72314 cases from the Chinese Center for Disease Control and Prevention. *JAMA* 2020; **323**: 1239.
- 9 Richardson S, Hirsch JS, Narasimhan M, Crawford JM, McGinn T, Davidson KW *et al*. Presenting characteristics, comorbidities, and outcomes among 5700 patients hospitalized with COVID-19 in the New York City area. *JAMA* 2020; **323**: 2052.
- 10 Pfoh ER, Wozniak AW, Colantuoni E, Dinglas VD, Mendez-Tellez PA, Shanholtz C *et al*. Physical declines occurring after hospital discharge in ARDS survivors: a 5-year longitudinal study. *Intensive Care Med* 2016; **42**: 1557–66.