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COVID-19 ARDS: getting ventilation right

We read with special interest the Article by Ryan Barbaro and colleagues,[1] describing the evolving outcomes of patients with COVID-19 who required extracorporeal membrane oxygenation (ECMO) during 2020. We were sad to corroborate the same increased mortality we had observed in our own patients. However, we wish to clarify two key aspects that we hope will supplement the conclusions of this important Article.

First, the assumption that a non-invasive ventilation (NIV) strategy can be deleterious for patients with acute respiratory distress syndrome (ARDS) and with COVID-19 has no clinical evidence so far.[2] Furthermore, NIV has been progressively used during the evolving pandemic and is probably more related to the improvement in survival observed in hospitalised patients than to a delay in intubation and hypothetically worse outcome.[3]

And second, when to start ECMO on these patients has probably changed during this period due to a higher use of NIV (the authors do not report days on NIV before intubation). We had never before ventilated so many patients with severe ARDS and we have learned that a so-called wait and see approach in terms of intubation or ECMO, as with many other invasive procedures in critically ill patients,[4] might also be valid. ECMO should be initiated in those patients who cannot be protectively ventilated in the context of extremely severe ARDS.[5] In this scenario, mortality might increase in those patients who finally require ECMO assuming that this delayed strategy will save many more other patients from receiving an intervention that is not free from complications besides its high cost of resources.

We declare no competing interests.

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Authors' reply

We thank Xosé Pérez-Fernández and colleagues for their thoughtful Correspondence regarding our study of extracorporeal membrane oxygenation (ECMO) in COVID-19.[1] We agree that our study does not provide evidence that forms of non-invasive ventilation (NIV), such as high-flow nasal cannula and mask or helmet ventilation, might be deleterious compared with other strategies. Our observational study was not designed to make causal inferences regarding the potential superiority of ECMO or any pre-ECMO support strategy. We showed that the more recent cohort with higher mortality had increased use of NIV and decreased duration of pre-ECMO invasive mechanical ventilation (IMV).[1] We did not measure the initiation time of NIV, however, and so could not test for an association between duration of pre-ECMO NIV and the relative risk of mortality.

Although many patients with severe COVID-19 might benefit from the use of NIV, the subset of patients who ultimately do not respond to NIV and require IMV are precisely those who are likely to have high work of breathing, high transpulmonary pressures, and who are therefore at risk of developing patient self-inflicted lung injury.[2] This situation might select for more severely ill patients receiving IMV and ultimately ECMO. It is one hypothesis out of a number we put forward to help explain the association with increased mortality in those who ultimately do not respond to these levels of support. However, this is not an argument for or against the use of NIV in this setting. Even if the hypothesis is correct, NIV might still be the appropriate therapy for any given patient. A randomised clinical trial is required to fully address this question.

To date, there are no prospective clinical trials evaluating the effect on outcomes of the timing of initiating ECMO support. However, in accord with the suggestion of

Pérez-Fernández and colleagues, post-hoc analysis of the ECMO to rescue lung injury in severe ARDS trial[3] suggests that patients with greater risk of developing ventilator-induced lung injury might be more likely to benefit from ECMO than those who were enrolled because of severe hypoxaemia.[3]

Our study showed that the mortality rate of ECMO-supported patients with COVID-19 worsened and the duration of ECMO support lengthened later in the pandemic.[1] We encourage centres to consider these factors when creating policies to guide ECMO allocation.[4] Moreover, during a pandemic, the use of resource-intensive interventions such as ECMO must also be informed by the needs of local health-care systems.[5]

RPB is the ELSO Registry chair. GM, and DB are on the ELSO board of directors. DB is the president-elect of ELSO. DB also chairs the executive committee for the International ECMO Network. ASS chairs the Scientific Oversight Committee of the International ECMO Network. RPB reports grants from the US National Institutes of Health (R01 HL153519, R01 HD015434, and K12 HL138039). ASS reports consulting fees from Baxter and Xenios in relation to ECMO. DB reports grants from ALung Technologies, and medical advisory board relationships with Xenios, Abiomed, Cellenkos, and Medtronic. JS declares no competing interests.

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Brazilian science under continuous attack

Despite the resistance of Brazilian scientists, science in Brazil has been undermined by measures implemented by the federal government in the past 3 years, such as increasing budget cuts, attacks on the autonomy of universities, and a general policy of denial of science. A recent budget cut of US$110 million to the Ministry of Science Technology and Innovations budget, in addition to the withholding of $490 million from the National Scientific and Technological Development Fund, not only represents an enormous impediment to conducting research at universities and research institutes, but also jeopardises the future scientific development of a country.[1] Consequences include a brain drain among scientists and demoralisation and discontent in the ranks of Brazilian scientific researchers. In addition, scientists risk indirect sanctions if their research contradicts the positions sustained by the Bolsonaro administration, such as affirming that the Amazon rainforest is not burning or that chloroquine or hydroxychloroquine can be used to safely and effectively treat COVID-19.[2]

The recent show of disrespect towards scientists was a federal decree, issued on Nov 5, 2021, revoking the National Order of Scientific Merit award granted to two scientists, Adele Schwartz Benzaken and Marcus Vinicius Guimarães de Lacerda.

In response to this revocation, 200 previous award recipients penned a letter expressing their objection, and 23 other Brazilian scientists currently nominated for this award withdrew their names in solidarity with their unfairly discredited colleagues.[3,4] This act also triggered an immediate reaction from several Brazilian academic and scientific societies, including the Brazilian Academy of Sciences and the Brazilian Society for the Advancement of Science. In early 2020, research by Borba and colleagues[5] showed that higher doses of chloroquine should not be recommended for the treatment of severe COVID-19.

Benzaken was the former director of the Brazilian STD/HIV-AIDS and Viral Hepatitis Department at the Health Surveillance Secretariat (Ministry of Health) who was fired in January, 2019.

The attacks perpetrated by the current federal administration are not limited to science and scientists, and affect education, public health, the environment, and cultural programmes.[6–8] It is our hope that Brazil will not continue to be guided by denial and will avert the degradation of science.


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All authors are Emeritus researchers from Fundação Oswaldo Cruz. We declare no competing interests.

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