Received: 15 August 2021 | Accepted: 22 September 2021

DOI: 10.1111/resp.14164

Official Journal of the Asian Pacific Society of Respirology
Respirology
APSR
WILEY

Letter from Brazil

Brazil reported its first case of coronavirus disease 2019 (COVID-19) on 25 February 2020 and has been one of the most severely affected countries in terms of number of cases and deaths. Up to 31 December 2020, Brazil reported more than 7.6 million confirmed cases and almost 195,000 deaths (2.5%).[1] Estimates suggest that 15%–20% of COVID-19 cases will require hospitalization, while 3%–5% will require admission to an intensive care unit (ICU).

Respiratory support, including invasive mechanical ventilation (IMV) and non-IMV (NIMV), has been used often to support COVID-19 patients admitted to an ICU with severe acute respiratory syndrome. Different levels of health infrastructure influence different COVID-19 mortality rates and/or risk factors. Also, lower rates of accessibility to ICU care have been correlated with higher COVID-19 lethality rates. Critically ill COVID-19 patients treated with IMV are at risk of death.

Brazil has registered COVID-19 patients' data from the Influenza Epidemiological Surveillance Information system, which is available online at https://covid.saude.gov.br. This register is highly representative of the Brazilian population with COVID-19 and its evaluation could be especially important to improve knowledge about patients admitted to the ICU. Retrospective analysis of national secondary data was used in the current analysis to evaluate the risk factors of mortality among COVID-19 patients admitted to the ICU, confirmed by real-time PCR testing and managed with various methods of respiratory support, between 1 March and 31 December 2020. Differences were considered significant when the p-value was <0.05. A logistic regression analysis was used to explore the association between comorbidities, with an emphasis on risk of death.

Out of a total of 322,817 adult COVID-19 patients hospitalized in Brazil throughout 2020, this study evaluated 116,640 (36.1%) patients who were admitted to the ICU, of whom 68,052 (58.3%) died. Most of the patients were male (58.5%), with a mean age of 63 ± 16 years. Forty-nine percent of patients needed IMV; the in-ICU mortality was 58.3%.

When analysing the adjusted risk of mortality for all patients admitted to the ICU, those treated with IMV had the highest risk of death (adjusted OR [aOR] = 10.24; 95% CI 9.76–10.75; $p < 0.001$). Trends towards a reduction in both IMV use as well as trends towards increased NIMV use were observed throughout 2020 ($p < 0.001$) (Figure 1A).

In patients not treated with IMV, patients older than 70 years also had the highest risk of death (aOR = 6.46; 95% CI 5.97–6.99; $p < 0.001$), followed by patients aged between 60 and 69 years (aOR = 3.49; 95% CI 3.34–3.65; $p < 0.001$) and those with cancer (aOR = 2.26; 95% CI 1.94–2.63; $p < 0.001$). (Figure 1B).

In this Brazilian analysis of patients who needed IMV or NIMV, age was the strongest risk factor associated with ventilation and death, even after adjusting for co-morbid conditions. Here, patients older than 60 years were at greater risk of death. The current study also showed a temporal trend towards more frequent use of NIMV, although this was also associated with an increased mortality rate. There is limited evidence favouring the use of regular, non-invasive respiratory support in critically ill COVID-19 patients.[2] NIMV was unsuccessful in preventing intubation in more than 33% of patients with mild ARDS, as well as 50% of patients with moderate and severe ARDS.[3] In severe cases of ARDS, almost

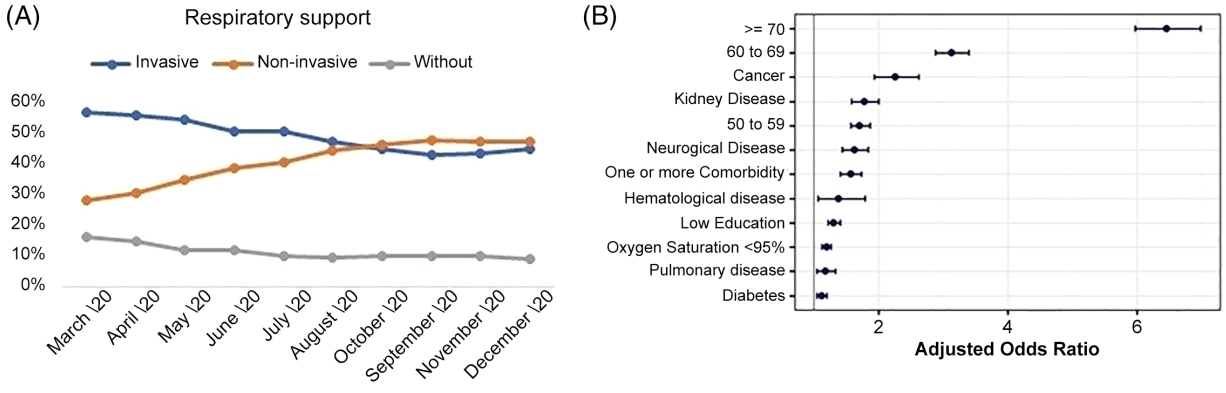

FIGURE 1 (A) Temporal distribution of patients with coronavirus disease 2019 (COVID-19) admitted to intensive care units, with or without respiratory support, either as invasive mechanical ventilation or non-invasive ventilation in Brazil ($N = 116,640$ patients). (B) Adjusted risk of mortality of patients with non-invasive ventilation ($N = 43.825$ patients)

90% of patients require IMV. Meanwhile, in COVID-19 patients, NIMV was unsuccessful in 47.7% of patients, and it has also been associated with increased mortality.[4]

In Brazil, many disparities in resources exist among regions, which may explain observed differences in mortality. Regional heterogeneity influences national health in terms of financial and social conditions, as well as quality of care. Higher rates of mortality occurred in patients relocated to other cities for upgraded hospital care. States and municipalities, based on household characteristics and the human development index, that had lower socioeconomic vulnerability indices also had improved capacities to expend hospital beds, higher adherence to isolation by their populations and lower mortality rates.[5] All these facts, when taken together, may help explain how well a particular region, state or city performs in facing the COVID-19 pandemic.

There seems to be no clear difference in terms of respiratory mechanics, gas exchange and mechanical ventilation settings when dealing with critically ill COVID-19 patients or classical ARDS patients. Thus, we propose that the reasons for the higher mortality in mechanically ventilated COVID-19 patients in Brazil may be related to regional collapse and/or disparities of healthcare systems, transportation delays of critical cases being admitted to ICU beds, inconsistent training of healthcare professionals and, possibly, lower adherence to best practice or guidance for clinical diagnosis and/or treatment, as well as social inequality.[6]

In conclusion, this Brazilian study showed that critically ill COVID-19 adult patients treated with IMV had more than a 10-fold increased risk of death compared to non-mechanically ventilated patients. Furthermore, multiple risk factors influenced mortality in critically ill COVID-19 patients throughout 2020, even in patients under different respiratory supports. Vaccines are advised immediately for all patients, while the use of a mask, social distancing and rigorous hand hygiene, among other preventive measures, must be seriously maintained during the current COVID-19 pandemic.

KEYWORDS
COVID-19, critical care medicine, ventilation

ACKNOWLEDGEMENTS
We would like to thank the team from the Influenza Epidemiological Surveillance Information System (SIVEP-Gripe) for making the utilized database available online and in the public domain; this study would not have been possible without this organization and the data collected from them. We also want to congratulate all health professionals who have worked relentlessly for the recovery of all patients investigated or treated for COVID-19. Finally, we wish to express all our respect and grief for all Brazilian families who have lost dear relatives throughout the pandemic period.

CONFLICT OF INTEREST
None declared.

ETHICAL APPROVAL
Ethical committee approval was not required as only secondary data available on the internet was used in this study.

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How to cite this article: Braz Júnior DS, de Mello MJG, Lyra NAB, Viana MMA, Borba VS, Thuler LCS, et al. Letter from Brazil. Respirology. 2021;26:1085–7. https://doi.org/10.1111/resp.14164