Heart & Lung 49 (2020) 348–349

Contents lists available at ScienceDirect

Heart & Lung

journal homepage: www.heartandlung.com

# ECMO for ARDS due to COVID-19

*Dear Editor,*

As of 09 March 2020, a cumulative total of 109,577 confirmed cases of coronavirus disease 2019 (COVID-19) were reported in 105 countries and territories worldwide.[1] In China, approximately 5% (2087/44,672) of critically ill patients with COVID-19 infection have presented rapidly progressive respiratory failure, development of acute respiratory distress syndrome (ARDS), and intensive care unit (ICU) admission.[2] Of the 2087 critically ill patients with COVID-19, 1023 (49%; 95%CI, 46.1% to 52.1%) have died in the ICU.[2] The prevalence of ARDS caused by COVID-19 is approximately 8.2% (187/2278) (95% CI, 7.07% to 9.47%)[3–8] (Table 1). Recently, Xu et al.[9] described the pathological characteristics of a patient who died from severe infection with severe acute respiratory syndrome coronavirus 2. The postmortem biopsies revealed that, apart from bilateral diffuse alveolar damage with cellular fibromyxoid exudates, the lungs of the patient showed pulmonary oedema with desquamation of pneumocytes and hyaline membrane formation, indicating ARDS.

Several critically ill patients with COVID-19 infection have required invasive mechanical ventilation and rescue therapies such as, prone positioning, and extracorporeal membrane oxygenation (ECMO).[3–8] ECMO has been proposed as a rescue therapy in severely hypoxemic patients with Middle East respiratory syndrome (MERS) caused by a coronavirus who failed conventional strategies[10]; however, support with ECMO is not available in many low-and-middle income countries around the world, where the healthcare budget is not sufficient to provide this organ support. ECMO might not seem to be as much of a priority as personal protective equipment, refine processes, and check logistics in the global response to the COVID-19 outbreak.

The complexity of ECMO requires a well-qualified ICU team to deliver care to critically ill patients with ECMO; therefore, the use of ECMO may be limited to expert, high-volume centres. Annual ECMO mortality rates vary widely across ECMO centres, and the interquartile range reported by Barbaro et al.[11] was 33 to 92% for adult patients treated with ECMO. Although there little evidence on the outcomes of patients with ARDS due to COVID-19 supported with ECMO, the results of the studies published during the COVID-19 outbreak show that the mortality rate of adult patients with ARDS due to COVID-19 undergoing ECMO is approximately 82.3% (14/17) (Fig. 1).[4,6–8] In summary, the use of ECMO is associated with high mortality in patients with ARDS due to COVID-19 and refractory hypoxia. The usefulness of ECMO as a rescue therapy for critically ill patients with ARDS due to COVID-19 is limited so far, and there is not enough evidence to support its use in this group of patients.

**Table 1**
Comparison of studies that reported Extra Corporeal Membrane Oxygenation (ECMO) as a rescue therapy for patients with acute respiratory distress syndrome (ARDS) due to COVID-19.

| | Huang C et al.[3] | Nanshan Chen et al. [4] | Wang D et al.[5] | Yang X et al. [6] | Guan WJ et al.[7] | Zhou F et al. [8] |
|---|---|---|---|---|---|---|
| **Study type** | Cross-sectional | Retrospective, observational | Case series | Retrospective, observational | Cross-sectional | Retrospective, cohort study |
| **n** | 41 | 99 | 138 | 710 | 1099 | 191 |
| **ICU admission, proportion,% (95% CI)** | 31.7 (18.08–48.08) | 17.17 (10.33–26.06) | 26.08 (18.98–34.24) | 7.32 (5.51–9.49) | 5.0 (3.79–6.46) | 26,17 (20.09–33.01) |
| **ARDS, proportion,% (95% CI)** | 29.26 (16.13–45.53) | 17.17 (10.33–26.06) | 19.56 (13.3–27.17) | 4.93 (3.45–6.78) | 3.36 (2.38–4.6) | 30.89 (24.1–37.96) |
| **Risk of death during ECMO support, relative risk (95% CI)** | Data were unavailable to calculate | 0.46 (0.09–2.39) | Data were unavailable to calculate) | 0.89 (0.61–1.29) | 2.88 (1.65–5.01) | 0.96 (0.66–1.41) |
| **Overall mortality rate, proportion,% (95% CI)** | 14.63 (5.56–29.17) | 11.11 (5.67–19.01) | 4.34(1.61–9.22) | 4.50 (3.10–6.30) | 1.36 (0.76–2.24) | 28,27 (22.0–35.22) |

https://doi.org/10.1016/j.hrtlng.2020.03.012
0147-9563/

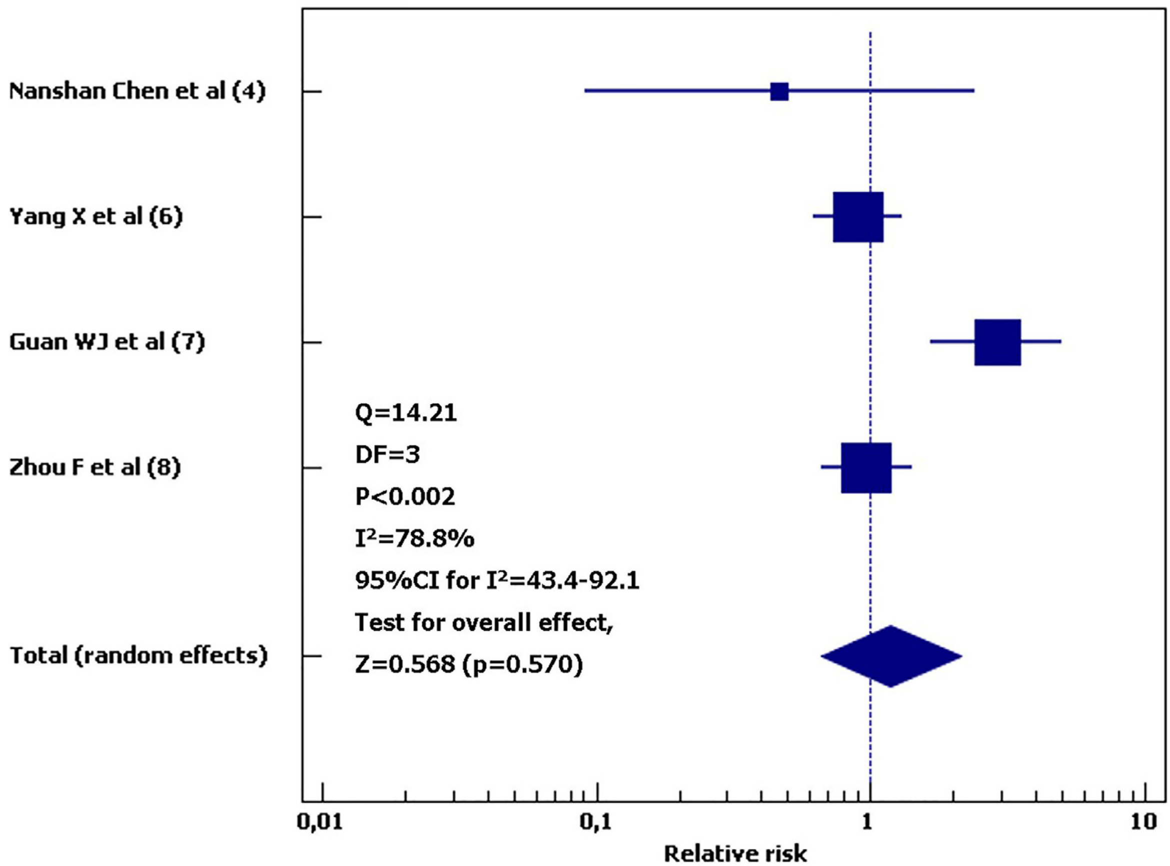


**Fig. 1.** Forest plot of intensive care unit mortality across 4 studies that have reported the use of ECMO in adults with ARDS due to COVID-19.

## Declaration of Competing Interest

I have no competing interests.

## References


1. WHO. Coronavirus disease 2019 (COVID-19) situation report-49. https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200309-sitrep-49-covid-19.pdf?sfvrsn=70dabe61_4. accessed 9 March 9 2020.
2. Novel Coronavirus Pneumonia Emergency Response Epidemiology Team. The epidemiological characteristics of an outbreak of 2019 novel coronavirus diseases (COVID-19) in China. *Zhonghua Liu Xing Bing Xue Za Zhi*. 2020;41:145–151.
3. Huang C, Wang Y, Li X, et al. Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. *Lancet*. 2020. https://doi.org/10.1016/S0140-6736(20)30183-5. published online Jan 24.
4. Chen Nanshan, Zhou Min, Dong Xuan, et al. Epidemiological and clinical characteristics of 99 cases of 2019 novel coronavirus pneumonia in wuhan, china: a descriptive study. *Lancet*. 2020. https://doi.org/10.1016/S0140-6736(20)30211-7. published online January 29.
5. Wang D, Hu B, Hu C, et al. Clinical characteristics of 138 hospitalized patients with 2019 novel coronavirus-infected pneumonia in Wuhan, China. *JAMA*. 2020. https://doi.org/10.1001/jama.2020.158. [published online ahead of print, 2020 Feb 7].
6. 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. https://doi.org/10.1016/S2213-2600(20)30079-5. published online Feb 21.
7. Guan WJ, Ni ZY, Hu Y, et al. Clinical characteristics of coronavirus disease 2019 in China. *N Engl J Med*. 2020. https://doi.org/10.1056/NEJMoa2002032. [published online ahead of print, 2020 Feb 28].
8. Zhou F, Yu T, Du R, et al. Clinical course and risk factors for mortality of adult inpatients with COVID-19 in Wuhan, China: a retrospective cohort study. *Lancet*. 2020. https://doi.org/10.1016/S0140-6736(20)30566-3. published online March 9.
9. Xu Z, Shi L, Wang Y, et al. Pathological findings of COVID-19 associated with acute respiratory distress syndrome [published correction appears in Lancet Respir Med. 2020 Feb 25]. *Lancet Respir Med*. 2020. https://doi.org/10.1016/S22132600(20)30076 X. [published online ahead of print, 2020 Feb 18].
10. Alshahrani MS, Sindi A, Alshamsi F, et al. Extracorporeal membrane oxygenation for severe Middle East respiratory syndrome coronavirus. *Ann Intensive Care*. 2018;8(1):3. https://doi.org/10.1186/s13613-017-0350-x. Published 2018 Jan 10.
11. Barbaro RP, Odetola FO, Kidwell KM, et al. Association of hospital-level volume of extracorporeal membrane oxygenation cases and mortality. Analysis of the extracorporeal life support organization registry. *Am J Respir Crit Care Med*. 2015;191(8):894–901. https://doi.org/10.1164/rccm.201409-1634OC.


Silvio A. Ñamendys-Silva, MD, MSc, FCCP, FCCM*
*Department of Critical Care Medicine, Hospital Medica Sur, Instituto Nacional de Cancerologia & Intituto Nacional de Ciencias Medicas y Nutricion Salvador Zubiran, Mexico City, Mexico*

*Department of Critical Care Medicine, Instituto Nacional de Cancerología and Intituto Nacional de Ciencias Médicas y Nutrición Salvador Zubirán, Mexico City, Mexico
*E-mail address:* snamendys@incan.edu.mx