

Outcomes of extracorporeal membrane oxygenation support for patients with COVID-19: A pooled analysis of 331 cases

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Title: Outcomes of Extracorporeal Membrane Oxygenation Support for Patients with COVID-19: A pooled analysis of 331 Cases

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Recently in this journal Chavez et al.¹ reviewed the current state of COVID-19, they noted that the role of extracorporeal membrane oxygenation (ECMO) was yet to be established. Indeed, other authors have gone so far as to issue caution on the use of ECMO at all as a rescue therapy for severe acute, hypoxemic respiratory failure secondary to the coronavirus disease 2019 (COVID-19).² An early pooled analysis of 17 patients receiving ECMO for COVID-19 suggests a mortality rate of 94.1%.³ Extracorporeal Life Support Organisation (ELSO) members currently report 470 confirmed COVID-19 positive ECMO runs; however, mortality is unclear with many patients receiving ongoing therapy; and no hospitals close to the epicentre of this crisis are ELSO members.⁴ We set out to determine the number of reported cases which ECMO support has been utilised in the treatment of COVID-19 and the associated mortality rate.

We undertook a systematic review of the major databases, medical grey literature, open registry databases and pre-published literature platforms from November 2019; see supplement for full strategy and statistical analysis methods. Studies reporting on ECMO support for COVID-19 patients and reporting mortality were eligible for inclusion. Data was extracted and a pooled prevalence of mortality with a 95% confidence interval was obtained by the random effects model.

The search identified 219 papers, 86 full texts were reviewed and 63 were excluded. Exclusions were related to patients not receiving ECMO or not relevant to COVID-19. Papers were examined for data origin and extraction dates by two authors, disagreements were resolved by consensus. Nine studies were excluded due to potential overlap (Table S1).

Ten studies and four registry databases were included, incorporating 331 cases (Table S2). Of these, 155 patients died. Overall, the pooled prevalence of mortality in ECMO patients was 46% (95%CI=34-59%). There was no asymmetry in the Doi plot (LFK index=-0.58).

Considering the mortality rate for critically ill patients receiving conventional treatments for COVID-19 is 59-71%,^{3,5} our results suggest that initial alarm about the outcomes of patients receiving ECMO support may not have been warranted. Clinicians need to balance hypothesised risks of worsening lymphopenia and cytokine storm during ECMO against the potential survival benefit in refractory hypoxemic respiratory failure. Some evidence suggests that early ECMO support has a greater benefit than when utilised after failing conventional measures.⁶ We will watch with interest as data from large multinational studies, such as the ExtraCorporeal Membrane Oxygenation for 2019 novel Coronavirus Acute Respiratory Disease (ECMOCARD) study, become available.

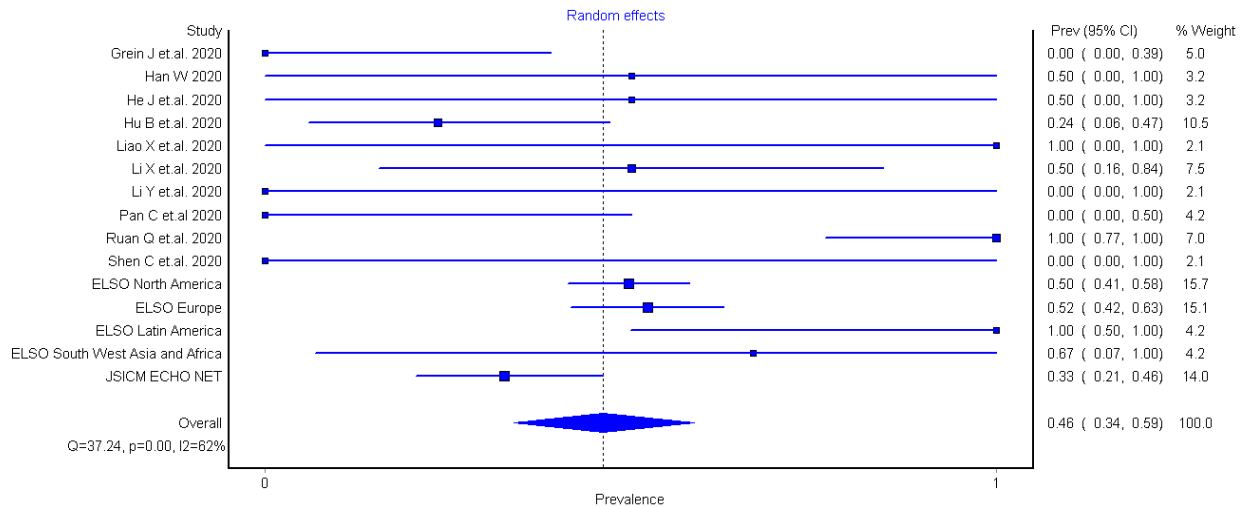


Figure 1: Pooled prevalence of mortality for COVID-19 patients managed with ECMO.

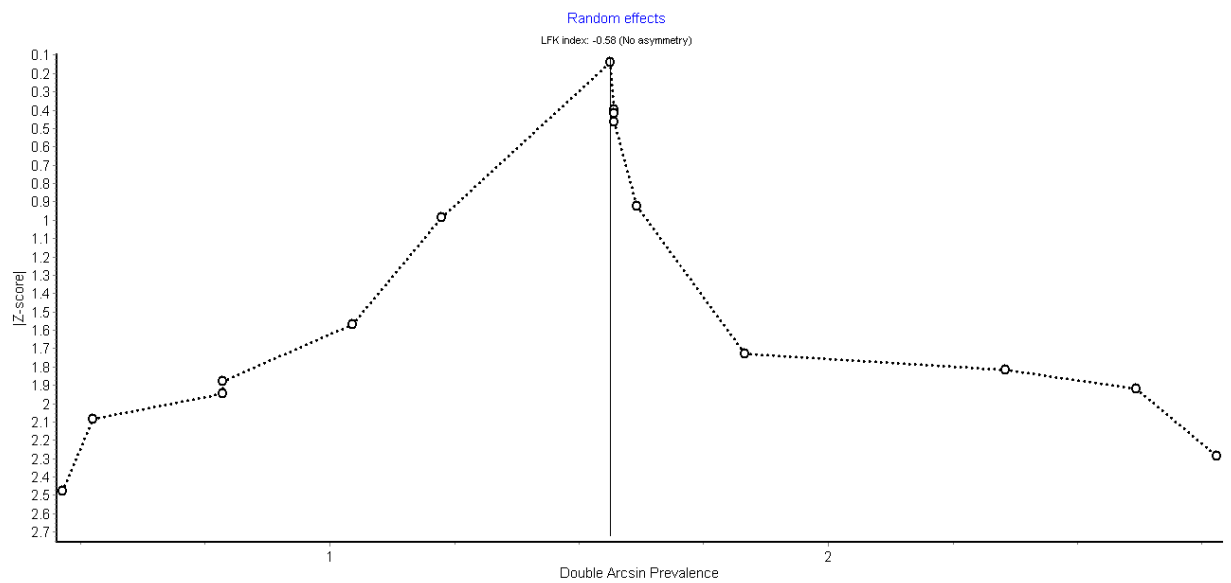


Figure 2: Doi plot of prevalence analysis for mortality of COVID-19 patients managed with ECMO. A Luis Furuya-Kanamori (LFK) index <1.0 indicates no asymmetry, 1.0 to 2.0 indicates minor asymmetry and >2.0 indicates major asymmetry.

References:

1. Chavez, S, Long, B, Koyfman, A & Liang, SY. Coronavirus Disease (COVID-19): A primer for emergency physicians. AJEM 24 March 2020 Online First: In Press
2. Henry, B.M., 2020. COVID-19, ECMO, and lymphopenia: a word of caution. The Lancet Respiratory Medicine, 8(4), p.e24.

3. Henry, B.M. and Lippi, G., 2020. Poor survival with extracorporeal membrane oxygenation in acute respiratory distress syndrome (ARDS) due to coronavirus disease 2019 (COVID-19): Pooled analysis of early reports. *Journal of Critical Care*.
4. Extracorporeal Life Support Organisation. 2020. ECMO In COVID-19 Registry. [online] Available at: <<https://www.else.org/Registry/FullCOVID19RegistryDashboard.aspx>> [Accessed 21 April 2020].
5. Yang, X., Yu, Y., Xu, J., Shu, H., Liu, H., Wu, Y., Zhang, L., Yu, Z., Fang, M., Yu, T. and Wang, Y., 2020. Clinical course and outcomes of critically ill patients with SARS-CoV-2 pneumonia in Wuhan, China: a single-centered, retrospective, observational study. *The Lancet Respiratory Medicine*.
6. Combes, A., Hajage, D., Capellier, G., Demoule, A., Lavoué, S., Guervilly, C., Da Silva, D., Zafrani, L., Tirot, P., Veber, B. and Maury, E., 2018. Extracorporeal membrane oxygenation for severe acute respiratory distress syndrome. *New England Journal of Medicine*, 378(21), pp.1965-1975.