

LETTER



ECMO for COVID-19 patients in Europe and Israel

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Dear Editor,

As of October 17th the novel coronavirus (SARS-CoV-2) caused a pandemic disease (coronavirus disease 2019, COVID-19) 40 million people worldwide, with almost one million deaths [1]. Although most patients have an uncomplicated clinical course, the more severe forms of COVID-19 require hospitalization and intensive care unit admission [2]. Conventional high-flow oxygen therapy, non-invasive and/or invasive mechanical ventilation, often in combination with prone positioning, have all been reported to be effective in the majority of patients [2]. However, in severe cases, life-threatening, refractory hypoxemia may occur [2]. Secondary infections, myocardial disease involvement and a hypercoagulable state with/without pulmonary embolism may also contribute to the complexity of treating these critically ill patients [3–5]. In such cases rescue therapy may be required.

The World Health Organization (WHO) [6], the Extracorporeal Life Support Organization (www.elso.org) and others have advocated the use of extracorporeal membrane oxygenation (ECMO) for patients with severe cardiorespiratory failure. Few patients in China received ECMO support in the early phase of the pandemic and the mortality rate among these patients was high [7]. Initial experience with COVID-19 in Europe was similar as the high number of critically ill patients disrupted usual

care pathways and stretched hospital resources [2]. There was probably some hesitation to provide a form of support which is considered highly resource consuming. However, despite the rapid growth in the number of critically ill COVID-19 patients in Europe, over time an unexpectedly high number of severely compromised patients were considered eligible for ECMO support. At this time the Steering Committee of the European chapter of the Extracorporeal Life Support Organization (Euro-ELSO) initiated prospective data collection among European and Israeli centres with the intention of providing near real-time information on ECMO use in COVID-19. The study was approved by the Maastricht University Ethical Committee (coordinating center) and is registered under ClinicalTrials.gov identifier: NCT04366921. Data are collected weekly and reported anonymously through the Euro-ELSO website <https://www.euroelso.net/covid-19/covid-19-survey/>. This voluntary study includes basic data on patients' age and gender, the details of their ECMO treatment and real-time status (i.e., ongoing, successfully weaned, or died).

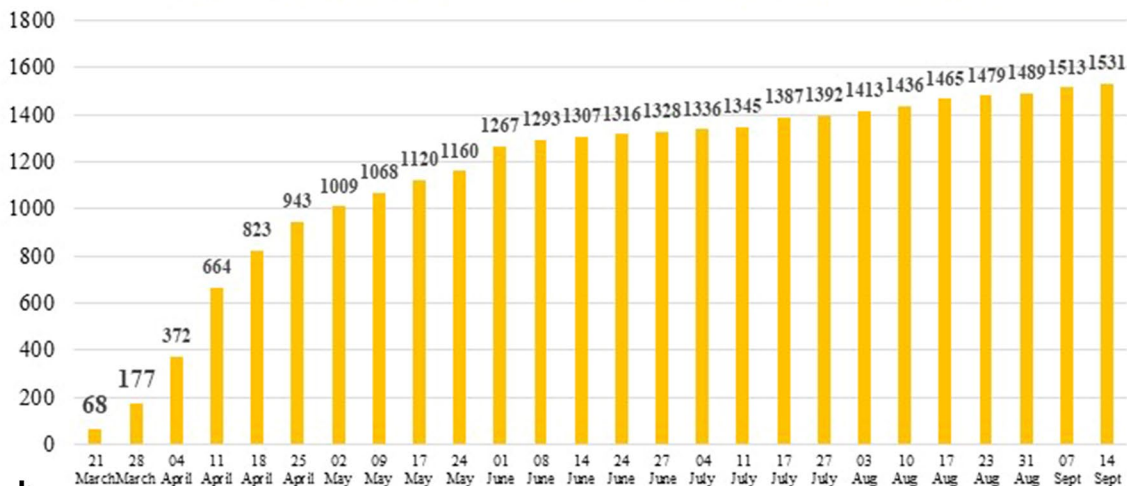
Since March 15th, 2020, 177 centres from Europe and Israel have joined the study, routinely reporting on the ECMO support they provide to COVID-19 patients. The mean annual number of cases treated with ECMO in the participating centres before the pandemic (2019) was 55. The number of COVID-19 patients has increased rapidly each week reaching 1531 treated patients as of September 14th. The greatest number of cases has been reported from France ($n=385$), UK ($n=193$), Germany ($n=176$), Spain ($n=166$), and Italy ($n=136$) (See Supplementary Fig. 1).

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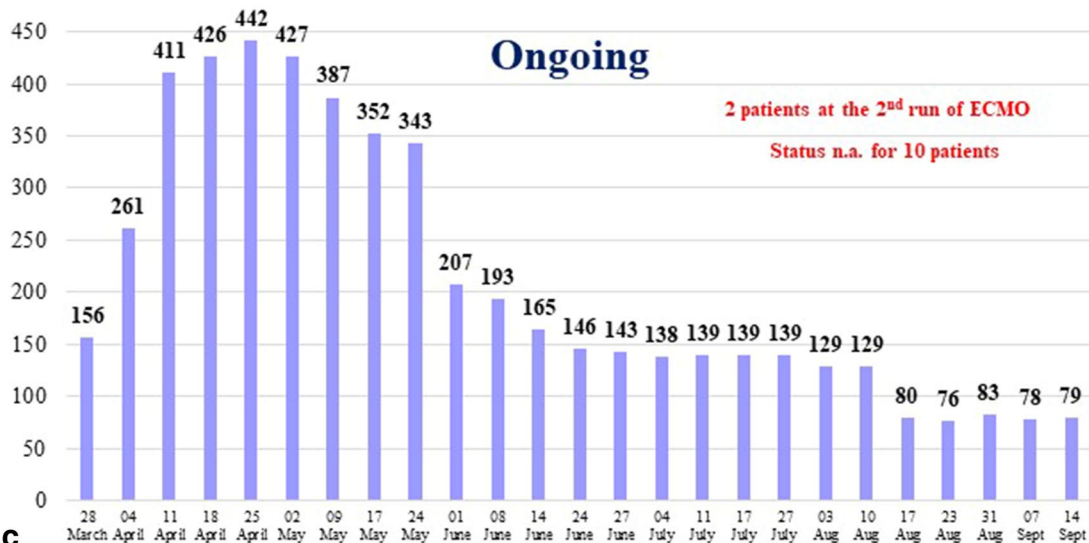
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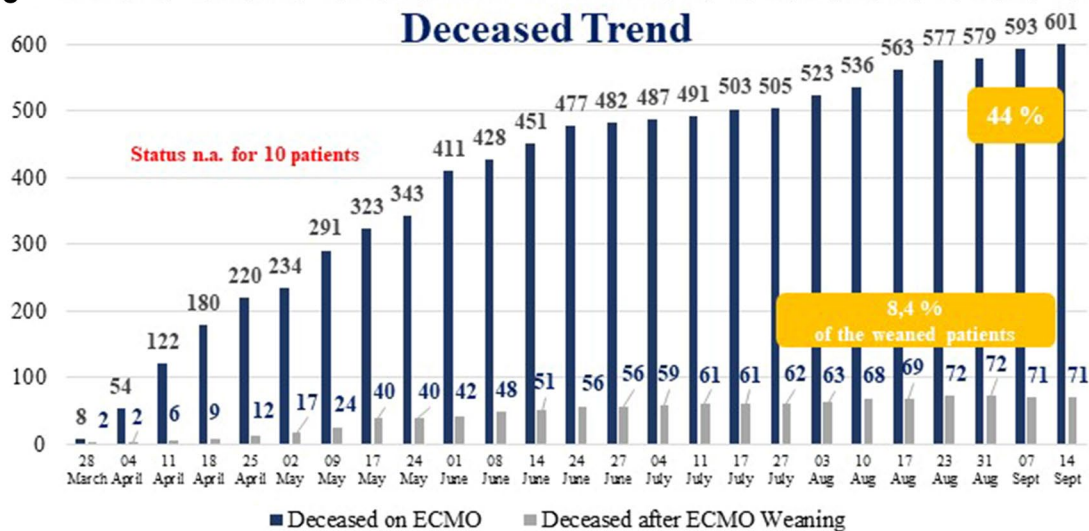
a European Trend for ECMO in COVID-19, number of cases



b



c



(See figure on previous page.)

Fig. 1 European trends of extracorporeal membrane oxygenation in COVID-19 as of September 14th, 2020. **a** Absolute number of ECMO cases as observed in 177 European/Israeli centres. **b** Number and percentage of ongoing cases, 2 patients at the 2nd run of ECMO included. **c** Number of patients deceased on ECMO and after ECMO weaning. Currently, 44% died overall, 8,4% died after weaning, e.g. 4,7% of all

The mean age of treated patients was 52.6 years (range 16–80), 79% were male. The ECMO configuration used was VV in 91% of cases, VA in 5% and other in 4%. The mean PaO₂ before ECMO implantation was 65 mmHg. The mean duration of ECMO support thus far has been 18 days and the mean ICU length of stay of these patients was 33 days. As of the 14th September, overall 841 patients have been weaned from ECMO support, 601 died during ECMO support, 71 died after withdrawal of ECMO, 79 are still receiving ECMO support and for 10 patients status n.a. (Fig. 1).

Our preliminary data suggest that patients placed on ECMO with severe refractory respiratory or cardiac failure secondary to COVID-19 have a reasonable (55%) chance of survival. Further extensive data analysis is expected to provide invaluable information on the demographics, severity of illness, indications and different ECMO management strategies in these patients.

Electronic supplementary material

The online version of this article (<https://doi.org/10.1007/s00134-020-06272-3>) contains supplementary material, which is available to authorized users.

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Compliance with ethical standards

Conflicts of interest

R.L. declares to be a consultant for Medtronic, LivaNova and Member of the Medical Advisory Board for Eurosets. J.B. declares to be a consultant for Abiomed and Getinge. The other authors declare that they have no conflict of interest.

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