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## Blood transfusion strategies and ECMO during the COVID-19 pandemic

### Authors' reply

We thank David Koeckerling and colleagues for their correspondence calling for restrictive blood transfusion strategies in response to our Health-care Development report on extracorporeal membrane oxygenation (ECMO) services for severe acute respiratory distress syndrome (ARDS) during the coronavirus disease 2019 (COVID-19) pandemic.<sup>1</sup> The ideal transfusion trigger during ECMO support remains uncertain. Daily transfusion of the magnitude mentioned by Koeckerling and colleagues happens occasionally in patients receiving ECMO, but such requirements seldom happen in adult patients receiving venovenous ECMO managed in centres with robust transfusion protocols.<sup>2</sup> The ECMO to Rescue Lung Injury in Severe ARDS (EOLIA) trial, the largest randomised controlled trial of patients receiving ECMO, adopted a conservative transfusion strategy (target haemoglobin level of 7–8 g/dL, increased to 10 g/dL if hypoxaemia persisted).<sup>3</sup> Massive bleeding events (needing >10 units of transfusion) occurred in only 2% of patients needing ECMO. The Extracorporeal Life Support Organization also advocates a restrictive approach, if possible.<sup>4</sup>

A recent global survey on transfusion requirements during venovenous ECMO,<sup>2</sup> with more than 400 respondents from 42 countries, showed institutional variations in

transfusion practices. Of note, the transfusion trigger was significantly lower in high-volume ECMO centres (>24 cases per year) because they followed protocol-based transfusion practices and accepted lower haemoglobin levels, as compared with low-volume centres (<12 cases per year).<sup>2</sup>

We believe that the majority of patients with COVID-19 who require ECMO could be treated with venovenous ECMO, and lower trigger thresholds (eg, 7 g/dL) would be tolerated if they are stable and not actively bleeding.<sup>5</sup> ECMO for such patients should be offered in experienced centres in line with WHO guidelines. Higher thresholds (eg, 8–10 g/dL) could be considered in patients with shock or evidence of impaired oxygen delivery despite ECMO. Efforts to maintain physiological haemoglobin levels during ECMO should not be done routinely; transfusion protocols with lower triggers coupled with blood preservation strategies (eg, auto-transfusion of circuit blood during decannulation)<sup>5</sup> should reduce blood transfusion in patients with COVID-19 needing ECMO support.

KR is a member of the Extracorporeal Life Support Organization (ELSO) ECMO Educational Task Force (ECMOed) and ELSO's data review committee and scientific overview committee. GM is a member of the executive committee of ELSO. AC reports grants and personal fees from Getinge and Baxter; he was president of EuroELSO and is a member of the executive and scientific committees of the International ECMO Network (ECMONet). DB is on the medical advisory boards for Breethe, Xenios, and Hemovent, and is a past medical advisory board member for Baxter and ALung Technologies; he is currently on the trial steering committee for the VENT-AVOID trial sponsored by ALung Technologies; he is a member of the board of directors of ELSO and is chairman of the executive committee of ECMONet. KS is a member of the

ECMONet scientific committee, the Asia-Pacific ELSO educational committee, and Australia and New Zealand's Intensive Care Society COVID-19 working group; he is also the lead of an ECMOed research working group.

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