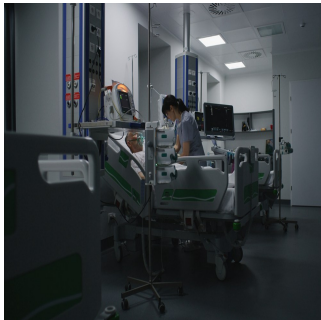


Conservative vs Liberal Oxygen Targets in VA-ECMO



Venoarterial extracorporeal membrane oxygenation (VA-ECMO) is increasingly used for treating cardiogenic shock and refractory cardiac arrest but involves significant risks and resource demands. It improves blood flow and oxygen content but often results in arterial hyperoxaemia. Although hyperoxaemia can be managed by adjusting the ECMO circuit and ventilator, the optimal oxygenation target during VA-ECMO remains unclear.

Severe hyperoxaemia can cause oxidative stress, DNA damage, lung toxicity, and vasoconstriction, potentially leading to higher mortality and worse neurological outcomes. Patients on VA-ECMO are also at risk of hypoxic respiratory failure, and conservative oxygenation targets might reduce the oxygen buffer provided by ECMO, causing organ injury. Recent studies suggest that lower oxygenation targets may be harmful.

Current guidelines recommend a post-oxygenator PaO₂ of 150 mm Hg and a systemic arterial oxygen saturation of 92–97%, but evidence supporting these targets is limited. There is no standardised approach for oxygenation targets or oxygen fraction adjustment in ECMO.

To address this, the Blend to Limit Oxygen in ECMO: A Randomised Controlled Registry (BLENDER) Trial was conducted to compare liberal versus conservative oxygenation targets and their effects on ICU-free days to day 28 in VA-ECMO patients with cardiogenic shock or refractory cardiac arrest.

In this trial, adult patients on VA-ECMO in the ICU were randomly assigned to either a conservative oxygen strategy (target SaO₂ 92–96%) or a liberal oxygen strategy (target SaO₂ 97–100%), managed through controlled oxygen administration via the ventilator and ECMO gas blender. The primary outcome was the number of ICU-free days by day 28. Secondary outcomes included ICU-free days by day 60, mortality, duration of ECMO and ventilation, ICU and hospital lengths of stay, and functional outcomes at six months.

From September 2019 to June 2023, 934 patients on VA-ECMO were reported to the EXCEL registry, and 300 (192 with cardiogenic shock and 108 with refractory cardiac arrest) were recruited for the study. Of these, 149 were assigned to a conservative oxygen strategy and 151 to a liberal strategy. The median number of ICU-free days by day 28 was similar between the groups (conservative: 0 days vs. liberal: 0 days, median treatment effect: 0 days). Mortality rates at day 28 (39.6% in the conservative group vs. 39.1% in the liberal group) and day 60 (43% vs. 41.1%) were also similar. All secondary outcomes and adverse events were comparable between the groups. However, the conservative group had 44 (29.5%) major protocol deviations, compared to only 2 (1.3%) in the liberal group.

A conservative oxygen strategy did not differ from a liberal strategy in terms of ICU-free days to day 28 or any other outcomes up to six months. Both strategies showed similar results for mortality, duration of ECMO and ventilation, and functional status. However, the conservative strategy was associated with more frequent protocol deviations. The trial suggests that while hyperoxaemia has been linked to adverse outcomes, the conservative oxygen strategy does not significantly impact patient outcomes compared to a liberal approach.

Source: [Intensive Care Medicine](#)

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Published on : Mon, 2 Sep 2024