Mental Health Outcomes Following Extracorporeal Membrane Oxygenation in Survivors of Critical Illness

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The use of extracorporeal membrane oxygenation (ECMO) is associated with better survival rates among select critically ill patients such as those with acute respiratory failure due to COVID-191-3 or cardiogenic shock.4 However, approximately one-half of patients who receive ECMO will die, and severe complications often arise during treatment, including bleeding, ischemia, and neurological problems.5 Consequently, the functional, cognitive, and mental outcomes after ECMO are extremely important, given that the overall goal of intensive care is survival with good or acceptable health. Yet, the short- and long-term physical and psychosocial outcomes of patients who survive after ECMO treatment are not well documented.6 Therefore, the study by Fernando and colleagues7 in this issue of JAMA is of utmost relevance.

In this study, the authors evaluated the incidence of new mental health problems following ECMO treatment in a population-based cohort study of 642 patients (mean age, 50.7 years) who were treated with ECMO in Ontario, Canada, over a 10-year period. These patients were matched 1:6 with 3830 survivors of treatment in the intensive care unit (ICU) who had not been treated with ECMO. Incidence of diagnosed new mental health conditions among survivors who received ECMO was 22.1 per 100 person-years (95% CI, 19.5-25.1) vs 14.5 per 100 person-years (95% CI, 13.8-15.2) among ICU survivors who had not received ECMO (absolute rate difference, 7.6 per 100 person-years [95% CI, 4.7-10.5]). After propensity weighting, ICU survivorship following ECMO treatment, compared with ICU survivorship without ECMO treatment, was significantly associated with a higher risk of new mental health diagnoses (hazard ratio [HR], 1.24 [95% CI, 1.01-1.51]). No significant differences were found for the secondary mental outcomes, eg, substance misuse, deliberate self-harm, and death by suicide. Surviving ECMO treatment was significantly associated with an increased risk of new mental problems.7

As a result of the study design, it is only possible to hypothesize about the causal factors between ECMO and new mental health problems. The authors elaborate about biological mechanisms that may manifest in psychiatric morbidity. Patients treated with ECMO might be more prone to hypoxemia, shock, and reduced oxygen delivery that can predispose neurons to apoptosis and higher risk for neurological complications such as ischemic stroke or delirium. The authors underscore that future studies should elucidate the potential mechanisms underlying these relationships.7

In the study by Fernando et al,7 only preexisting mental health diagnosis (HR, 2.39 [95% CI, 1.78-3.20]) and having had an outpatient psychiatry visit in the year prior to the index admission (HR, 1.82 [95% CI, 1.25-2.65]) were significantly associated with outcome of a new mental health diagnosis. This finding corroborates results of previous studies that showed pre-ICU health status was the most important prognostic factor for mental health outcomes after ICU care, and even suicide.8,9 This suggests that ECMO treatment might be an extra trigger for mental problems in patients who already are vulnerable to mental health conditions. Almost half of the study population, including patients who received ECMO and those who did not, had at least 1 primary care or psychiatry visit for mental health in the preceding 5 years. This raises the question of whether the primary outcome truly reflected new mental health problems. However, a sensitivity analysis that excluded patients with mental health diagnoses in the years prior to the index admission was consistent with the primary conclusion: ICU patients treated with ECMO experienced more mental problems compared with other ICU patients not treated with ECMO. Nonetheless, the study design makes it difficult to select a truly “unexposed” group of patients without a history of mental problems.

A strength of this study is the completeness of the data. The results were based on large population-based administrative databases and included a broad range of mental problems. Frequently, long-term follow-up studies on health problems following ICU treatment are questionnaire studies that focus primarily on anxiety, depression, and posttraumatic stress disorder. Questionnaire research is subject to nonresponse bias, and older more severely ill patients are underrepresented in those studies.8 Conversely, use of administrative data sets is associated with some limitations, such as the omission of care paid for privately, the inclusion of only diagnosed and treated mental problems, dependence on coding by individual practitioners, and changes in help-seeking behavior. Questionnaire research also captures mild problems and measures quality of life of survivors—information not captured in financial administrative databases. Another inherent problem in observational studies is the limitation of unmeasured confounding factors that are associated with new mental health problems such as patients’ education level, cognitive capacity pre-ICU, and the course of the hospital admission, including occurrence of complications and medications received.8 Without adequate adjustment for known confounders, it is difficult to attribute the findings (more mental health problems) as solely related to ECMO treatment.

From a holistic point of view, it would have been helpful in the study by Fernando et al7 to also report physical and cognitive health outcomes included in administrative databases.10

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Survivors of ICU admission commonly experience physical problems that affect their daily life and mental well-being. The interplay between physical and mental well-being can be an explanation for the higher rates of mental problems observed among patients who received ECMO compared with other ICU survivors. ECMO treatment is an extrastressful event added to the physical, mental, and other stressors inherent in patients who require ICU admission. In the study by Fernando et al, the mean (SD) length of stay was 3 times longer for ICU patients who were treated with ECMO (ICU length of stay, 11.4 [18.1] days; hospital length of stay, 55.5 [49.9] days) compared with those who did not receive ECMO (ICU length of stay, 4.1 [5.3] days; hospital length of stay, 15.3 [25.4] days). The recovery trajectory for patients who received ECMO, mostly focused on physical problems, is extremely labor intensive and may expose the limitations of their capacity and as such, may affect patients' mental well-being.

Although ECMO is increasingly used and can improve survival of carefully selected patients, the long-term outcomes of ECMO remain underinvestigated, resulting in limited insight about the added value for patients and their health outcomes. The cost of hospital treatment with ECMO is high, ranging from US $22,305 to US $334,608 among adults. Accordingly, the use of ECMO is a pressing question in times of scarce resources and personnel—should clinicians use everything available in health care and especially for critically ill patients in the ICU? Sustainability of health care is a top priority that forces clinicians to weigh the costs and benefits of expensive treatments such as ECMO and to avoid costly care with minimal or no added value for patients' lives. The study by Fernando and colleagues could help inform this issue by providing novel insights about the potential value of ECMO with respect to mental problems experienced by survivors of critical illness treated with ECMO. The absolute difference in new mental health disorders between patients who received ECMO and those who did not was small but does not necessarily represent a reason to withhold ECMO treatment. Mental problems are just 1 aspect of post-ICU sequelae besides physical and cognitive problems and patients' quality of life. Importantly, the current study also should encourage researchers to pursue more robust cost-effectiveness evaluations of ECMO for short-term and long-term outcomes in all health domains. This is essential information for treatment decisions, for informing patients and their relatives, for tailoring the post-ICU recovery trajectory to problems of this specific ICU patient group, and for determining what are acceptable outcomes, from whose perspective, and at what cost?

ARTICLE INFORMATION

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