



# Pediatric Extracorporeal Membrane Oxygenation Practices in Türkiye: Problems and Solutions

## Türkiye’de Pediyatrik Ekstrakorporeal Membran Oksijenasyon Uygulamaları: Sorunlar ve Çözümler

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### Dear Editor,

Access to extracorporeal membrane oxygenation (ECMO) is a critical issue even in developed countries. For example, there are no reports on ECMO accessibility in Türkiye, whereas in the USA one-third of the population does not have access to ECMO.<sup>1</sup> Using aeromedical services to transfer patients to ECMO centers is the most suitable means of addressing this problem.<sup>1</sup>

Despite its use of high technology, the safety and quality of ECMO primarily depend on staff education and human factors. During extracorporeal life support (ECLS), procedural stress and workload increase, but dependence on team performance decreases over time. It is also a complex process. In ECLS applications, successful decision-making is possible in systems with effective communication and individual responsibility. Thus, a competent ECLS team leader and ECMO simulation training are crucial.<sup>2</sup> During ECMO runs, personnel should use checklists to identify errors in the process.

In a German study, a perfusionist-free method was evaluated at a university hospital. A wet-in-primed ECMO circuit was set up for cannulation and checked by the perfusionist. The method was found to be feasible and safe.<sup>3</sup> ECMO centers in our country could consider implementing this method in settings with low availability of perfusionists.

There are many difficulties in establishing ECMO programs in developing countries. These include a lack of resources, financial restrictions, limited infrastructure, equipment shortages, a lack of trained personnel, obligations to achieve sufficient case volumes, and the absence of an appropriate, standardized ECMO protocol at medical centers.<sup>4</sup>

As part of the Turkish pediatric ECMO study group, Ekinci et al.<sup>5</sup> conducted a survey of ECMO presence and capabilities in pediatric intensive care units across Türkiye and of the units’ directors. According to unpublished data from the Turkish pediatric ECMO study group, half of the pediatric intensive care units are able to perform ECMO, while the other half transfer ECMO patients to hospitals with an ECMO center. The most widespread problem was the lack of surgeons or expertise in pediatric patient cannulation. Other common problems, in sequence, are the lack of trained staff and of ECMO equipment. 80% of the ECMO centers performed ECMO in the last five years, and 80% of these centers performed fewer than five ECMO treatments a year.<sup>5</sup> Based on these data, governors and policymakers need to resolve the problems.

We could offer solutions to address problems in pediatric ECMO in Türkiye. First, local ECMO centers should be restructured by the National Health Services based on the child population in each region. Second, pediatric intensivists

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and cardiac surgeons should be trained by a board of cardiovascular surgeons in pediatric ECMO and cannulation procedures. Additionally, pediatric intensive care nurses and perfusionists should receive regular training from healthcare providers. ECMO centers should have sufficient devices and cannulas. If the center lacks sufficient ECMO devices or the patient is not suitable for transfer, cardiac surgeons should perform cannulation and connect the patient to a bypass device. The patient can then be stabilized directly or by a pediatric intensivist via telemedicine. Once stabilized, the patient can be transferred to an ECMO center. Rather than attempting to transport critically ill pediatric patients to a specialized center without ECMO support, it is safer for a specialist team to deploy to the patient's location, initiate ECMO promptly, and transport the patient while the patient remains supported by ECMO.<sup>6</sup> Currently, there are no specified ECMO transport aircraft, ground ambulance vehicles, or ECMO teams in Türkiye. This situation causes transportation-related problems. Sometimes, ECMO center members go to the patient's hospital, set up the circuit, and transport the patient on ECMO. The first Turkish pediatric ECMO transport series was reported in 2022.<sup>7</sup> Six patients were transferred to a referral center by air transport. No complications were reported by the authors.<sup>7</sup> Another issue in Türkiye is that double-lumen cannulas for venovenous ECMO are not available for infants. Instead, venoarterial ECMO is used for pediatric acute respiratory distress syndrome and is associated with increased complications and morbidity in affected infants. The Second Pediatric Acute Lung Injury Consensus Conference of the pediatric acute lung injury and sepsis investigators network suggests the use of veno-venous ECMO over veno-arterial ECMO in patients with pediatric acute respiratory distress syndrome who have adequate cardiac function.<sup>8</sup> Some pediatric cardiac hospitals have treated children with congenital heart disease for years. The doctors in pediatric cardiac hospitals have also performed ECMO for years, and they should be included in the pediatric ECMO program for children with heart diseases.<sup>9</sup>

We established the pediatric ECMO study group within the Turkish Society of Pediatric Emergency and Intensive Care Medicine in 2021. Members of the pediatric ECMO study group are included in this study. This Turkish pediatric ECMO study group evaluates problems, challenges, and solutions related to performing pediatric ECMO. We conduct two pediatric ECMO courses for pediatric intensivists and provide training for fellows, including lectures on pediatric ECMO practices. Our educational program can contribute to a pediatric ECMO program in Türkiye. In addition, our study group has published pediatric ECMO guidelines, which are available on the Turkish Society of Pediatric Emergency and Intensive Care Medicine

website.<sup>10</sup> The Turkish pediatric ECMO study group has conducted epidemiological studies, which have contributed to national and global ECMO data.

A pediatric ECMO program in Türkiye should provide solutions because these problems cannot be completely identified and resolved by pediatric intensive care specialists. The Ministry of Health should form a national ECMO committee and establish a program to detect problems and find solutions not only for pediatric patients but also for neonates and adults. The ECMO program should include established regional ECMO centers; trained doctors (especially intensivists), surgeons, nurses, and perfusionists; and mobile ECMO teams to serve remote regions.

**Keywords:** Children, developing countries, extracorporeal membrane oxygenation

**Anahtar Kelimeler:** Çocuk, gelişmekte olan ülkeler, ekstrasörpöreal membran oksijenasyonu

#### Footnotes

#### Authorship Contributions

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