Authors have nothing to disclose with regard to commercial support.

Since July 2013, there have been 198 hypothermic patients who consulted with the Hypothermia Coordinators. A total of 167 patients with cardiac stability underwent noninvasive rewarming in the referral hospital.

A total of 31 patients were admitted to our center in deep hypothermia and were treated with ECMO VA therapy. Seventeen of the patients were admitted in a state of cardiac arrest (time between admission and starting ECMO therapy was 107-345 minutes). In this group, 9 patients died and 8 patients (47.06%) registered 15 points on the Glasgow Coma Scale and 1 point on the Cerebral Protection Category. The other 14 patients were admitted in cardiogenic shock. Of these, 5 patients died, and 9 patients (64.29%) survived and registered 15 points on the Glasgow Coma Scale and 1 point on the Cerebral Protection Category (64.29%).

The results of treatment of all patients treated are collected and submitted to the international Web site registry at <https://www.hypothermia-registry.org/>.⁴ Cardiac surgery centers, with highly trained personnel experienced in extracorporeal life support, are ideal places to establish a local center to treat severe accidental hypothermia.

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A CALL FOR STANDARDIZED END POINT DEFINITIONS REGARDING OUTCOMES OF EXTRACORPOREAL MEMBRANE OXYGENATION

Reply to the Editor:

We read with great interest the letter from Darocha and colleagues¹ regarding our recent review² of extracorporeal membrane oxygenation (ECMO). It is clear that Darocha and colleagues¹ deserve congratulations for their pioneering work toward implementing venoarterial ECMO to resuscitate patients with accidental deep hypothermia complicated by hemodynamic instability or cardiac arrest. Less clear, however, is whether the presented data truly “completes” a comprehensive review of contemporary ECMO, as they contend in their letter.

The expansion of ECMO during the last decade continues at a furious pace, as evidenced by the trend in annual ECMO-related publications during this time (Figure 1). ECMO innovation is occurring so rapidly that it has become nearly impossible for the interested reader to keep up with the latest literature on the topic. For example, during the 3 months that passed between the publication of our initial article and the submission of this letter, the *Journal of Thoracic and Cardiovascular Surgery* alone published or accepted for publication at least 4 additional original or review articles about ECMO.³⁻⁶ Other major journals in the fields of cardiovascular medicine and critical care have also published original research on ECMO, ranging from initial experiences with novel indications such as post-pulmonary endarterectomy⁷ and cardiopulmonary failure

FIGURE 1. Number of PubMed-indexed publications with any of the terms “extracorporeal membrane oxygenation,” “ECMO,” “extracorporeal life support,” or “ECLS” included in the title, abstract, or both from 2000 to 2015. *ECMO*, Extracorporeal membrane oxygenation.

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in peripartum women⁸ to large database-derived studies regarding patient morbidity and mortality after ECMO therapy.^{9,10}

Despite this triumphant rise of ECMO to the forefront of critical care medicine, the optimal management of and patient selection for this disruptive technology has perhaps never been more uncertain. As outlined in our initial review,² the level of evidence supporting the majority of the most common ECMO indications is severely limited, with case series and case reports dominating much of the data available to the diligent evidence-based medicine practitioner. Even in studies with large sample sizes or adequate comparison groups, no standardized definitions for outcomes regarding morbidity and mortality have been adopted for ECMO. This makes comparisons between and generalizations from published sets of ECMO data quite difficult. For example, Darocha and colleagues¹ elected to summarize outcomes in terms of survival with maximal Glasgow Coma Scale score at an unspecified interval, but none of the other previously cited articles³⁻¹⁰ reference Glasgow Coma Scale score when describing patient outcomes, even including the article focused on neurologic outcomes.¹⁰

To encourage increased quality of the available data regarding ECMO, we repeat our call for the development of standardized end point definitions for clinical outcomes of interest to clinicians. This is especially important given the reality that prospective, randomized studies comparing ECMO with other therapies or comparing various ECMO management strategies against one another are simply not practical in many cases. Until the level of evidence supporting ECMO is elevated above its current status, it is unlikely that ECMO will reach its maximal potential. Cardiothoracic surgeons have previously established standardized end point definitions with great success. For example, the Society of Thoracic Surgeons National Databases,¹¹ the Society of Thoracic Surgeons and American College of Cardiology Transcatheter Valve Therapy Registry database,¹² and the International Society for Heart and Lung Transplantation¹³ have all developed standardized end point definitions relevant to interventions routinely performed by cardiothoracic surgeons. Now, advocates of ECMO must meet this challenge head-on to ensure that this potentially life-saving therapy is appropriately used—whenever, wherever, and for whomever that may ultimately be.

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