

Defining the Standard in Extracorporeal Membrane Oxygenation Education

A Necessary Beginning

Peggy K. Han, M.D.¹, Tavenner Dibert, M.D.², and Kathleen R. Ryan, M.D.³

¹Division of Critical Care Medicine, Department of Pediatrics, Stanford University School of Medicine, Palo Alto, California; ²Division of Critical Care Medicine, Department of Pediatrics, University of Florida College of Medicine, Gainesville, Florida; and ³Division of Cardiology, Department of Pediatrics, Stanford University School of Medicine, Palo Alto, California

It is well known that there is significant variability in extracorporeal membrane oxygenation (ECMO) education practices worldwide (1, 2). In this issue of *ATS Scholar*, Patel and colleagues sought to codify ECMO education and credentialing practices across a wide variety of ECMO centers, including international centers, Extracorporeal Life Support Organization (ELSO) and non-ELSO centers, and low- and high-volume centers (3). The authors used survey data to describe differences in various education and credentialing practices related to individual ECMO centers. Their study reports the perceived importance of educational offerings to maintain competency, noting ECMO volume, regular-interval simulations, clinical protocols, and quality-improvement initiatives of greater perceived importance than research, attendance at national conferences, and journal clubs. Importantly, their survey offered needed detail regarding sparse credentialing practices, specifi-

cally perceived barriers and variability in responsibility for credentialing.

A recent scoping review of published ECMO education literature demonstrated additional areas of variation in targeted learning groups, targeted learning domains based on Bloom's taxonomy, and educational content delivery (4).

Additionally, the application of the Medical Education Research Study Quality Instrument (5) suggested a great need for multiinstitutional sampling and increased validity in assessments to render ECMO education scholarship meaningful and useful. The scoping review illustrates the current landscape of ECMO education as one with wide variation in the aforementioned areas, mirroring the findings of Patel and colleagues. Although the largest volume of publications on ECMO education use simulation-based education, a consensus regarding the fidelity of simulations is also lacking. Because ECMO simulation programs are not

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uniformly established (6), conferring educational standards, including those for simulation and assessment, naturally falls upon large organizations like ELSO. Although ELSO has recently created a standardized adult ECMO curriculum, coupled with a practitioner certification pathway (7), ongoing work must be done to standardize curricular materials and assessments, define simulation fidelity as it relates to learning objectives, recommend a frequency of educational activities, and collect data from ECMO centers worldwide to more precisely describe educational practices. Establishing a standard for ECMO education and credentialing processes is the first step toward defining a minimum standard for competency.

Even though Patel and colleagues surveyed several ECMO centers, the low response rate (34%) may reflect a significant selection bias. The lack of a consistent definition of small- versus large-volume centers, as well as defining center volume differently than Muratore and colleagues (8), limit the interpretation of the impact of volume on education and credentialing practices. Finally, without knowing the discipline and educational training of survey respondents or whether the respondents themselves participate in education as teachers or learners, the understanding of what may drive education and credentialing practices at various centers is truncated.

The limitations of the data obtained by Patel and colleagues notwithstanding, the paper raises important questions regarding credentialing practices. Why do fewer than half of surveyed programs have standard practices? What barriers limit, and what further resources are necessary for, the implementation of education and credentialing standards? Muratore and

coworkers note that one modifiable barrier to credentialing practices is the lack of established guidelines (8). Subsequently, groups have published educational resources, including ECMO entrustable professional activities (9) and validated assessments to determine ECMO skills (10, 11). Currently, work to develop standardized guidelines for credentialing is under way at ELSO with the goal of answering the challenging question of whether credentialing equals competency. Without a more precise understanding of the landscape of ECMO education and credentialing practices, a solid foundation of standardization cannot be built. The strategies to overcome variability in education are likely the same as those to establish credentialing programs: funding, infrastructure, and time. A deeper understanding of these specific areas is necessary to facilitate the adoption of standardized credentialing programs and lays the groundwork to determine whether minimum competency is achieved.

When these needs for developing a strong credentialing program are understood, a second critical question is whether standardized ECMO education leads to improved clinical ECMO outcomes. Zakhary and colleagues identified how global ECMO use has increased considerably during the past 10–15 years without lower complication rates despite its increasing use and familiarity (2). This demonstrates the need for standardized ECMO education and credentialing as the foundation to allow for future investigations of the impact of provider competency on decreasing complications and improving survival outcomes.

Overall, Patel and coworkers' study demonstrates the wide variability in ECMO education, training, and

credentialing worldwide and emphasizes the need for standardization of these processes. Future studies that anchor on established frameworks, such as the Medical Education Research Study Quality Instrument or even the guidelines described by the ELSO Education Committee, would better inform educational practices worldwide. Perhaps a further role for ELSO is to collect data specific to educational programs, including the fidelity of simulations, funding for educational programs, and composition of educators. ECMO education and credentialing practices would benefit from a worldwide educational scholarship network that would minimize sampling bias, encourage the use of standardized curricular materials, and promote multiinstitutional collaboration to advance education.

Although the connections between education, credentialing, and patient-level or institutional-level outcomes are elusive, it is difficult to contest that high standards in ECMO education are mandatory. Technological advances in education should be maximally leveraged to augment provider skill and experience as they pertain to ECMO clinical practice. More attention needs to be paid to ECMO education to establish, adopt, and examine a core standardized curriculum that then allows for credentialing practices. Only with this foundation will it be possible to determine if credentialing translates to competency and if improved competency leads to better care for patients receiving ECMO.

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