

## 4th Annual ELSO-SWAC Conference Proceedings

# Qatar welcomes the Extracorporeal Life Support Organisation of the South and West Asia Chapter 2017 Conference

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Extracorporeal Life Support (ECLS) is saving an increasing number of lives worldwide,<sup>1</sup> so it is a great pleasure to welcome for the first time in Qatar the South and West Asia Chapter (SWAC) of the Extracorporeal Life Support Organisation (ELSO). The conference organizing and scientific committees have worked tirelessly under the leadership of Dr Ibrahim Fawzy Hassan (2017 Conference Chair) to make ELSO SWAC 2017 an enriching event that will help progress ECLS in the region. For this special occasion, the SWAC ELSO 2017 submission editorial team (AAH, AS, GA, CC, TM) is pleased to have been able to publish all accepted abstracts in this special issue of the *Qatar Medical Journal (QMJ)* as a legacy of everyone's efforts and commitment to contribute to saving lives. The vast majority of the abstracts are invited contributions from selected clinicians who are bringing specific knowledge and expertise to the conference and to the pre-conference workshops. The submissions received as part of the call for abstracts are presented at the end of this *QMJ* issue and been presented either as short oral or poster presentations during the conference. All submissions have been subjected to a rigorous peer review process involving a team of reviewers with a range of subject expertise and to whom we are grateful. Overall, this *QMJ* special issue represents the scientific contributions from over 150 authors from 17 countries. The spread of the safe practice of ECLS, especially with regard to severe respiratory failure (SRF), relies on effective team training and education of the clinicians. To that effect, this year's theme is "*Bringing ECMO Simulation to Life*" and is directly reflected in the series of simulation-based pre-conference workshops which include:

- Adult respiratory ECMO
- Adult cardiac ECMO
- Neonatal and pediatric ECMO
- Percutaneous cannulation ECMO
- ECMO transport

We hope that the experiences regarding simulation technology<sup>2-4</sup> and educational approaches<sup>5</sup> shared within the abstracts will benefit everyone. We believe that ECMO-specific simulation plays a vital role in safely implementing this crucial but complex lifesaving treatment modality in the medical community.<sup>6,7</sup>

The first successful clinical use of ECMO (Extracorporeal Membrane Oxygenation) was seen in the 1970s followed by encouraging results in clinical trials in neonatal population in the 1980s. ECMO became a standard of care for management of post-operative cardiac failure in major pediatric heart centers in the 1990s. The use of ECMO as a modality of care in adult ICU was initially faced with multiple challenges until H1N1 flu pandemic in 2008 – 2009 which, along with major improvement in devices, led to a rapid increase in its use for cases of acute respiratory distress syndrome (ARDS). Currently, ECMO is used for severe heart and lung failure in all ages.<sup>8</sup>

After being almost abandoned, veno-venous (VV) ECMO, commonly known as "respiratory" ECMO gained a new and strong legitimacy among ARDS therapies. Indeed, whether among neonatal, pediatric, or adult cases, the number of respiratory ECLS runs has increased over the last decade and has the best patient survival rate of all ECLS strategies.<sup>9</sup> Every year, new centers start their program with the best aspirations of saving lives and share information about their journey.<sup>10-14</sup> As VV ECMO is becoming the gold standard therapy as a bridge to many options (e.g. recovery, diagnosis, decision, transplant), it is nearly becoming unacceptable to die from an acute SRF. The abstracts presented in this conference show that teams use VV ECMO for increasingly diverse clinical indications such as pulmonary embolism (PE), septic shock, trauma, and HIV,<sup>15-20</sup> far from the formerly accepted indications. The positive outcomes sometimes achieved are encouraging and support the idea of researching new ECMO applications as a rescue therapy.

Nurses are an integral part and essential to the VV ECMO management team. Daily nursing care of ECMO patients is an area of research for improving VV ECMO management.<sup>21</sup> Finally, the historical imperative need to anticoagulate all patients on VV ECMO

becomes actually nuanced and better assessed by many centers depending on the clinical situation if the risk of bleeding is high.<sup>20,22,23</sup> This allows the possibility of initiating ECMO on patients who have a contraindication to anticoagulation.<sup>24</sup> It seems VV ECMO continues to successfully shape its own future. Another form of ECLS therapy is cardiac or veno-arterial (VA) ECMO for which indications are also diverse. Established indications include post-cardiotomy and as a bridge to recovery or to mechanical support. Provision of VA ECMO for cardiac arrest survivors and as part of cardio-pulmonary resuscitation (E-CPR) is gaining popularity worldwide.<sup>25</sup> The results of this novel resuscitation strategy remain to be established. Enthusiasts advocate E-CPR for out-of-hospital cardiac arrest, while others provide E-CPR in the Emergency Department.<sup>26,27</sup> Most probably, we will learn along the way how to better select patients and who are the most likely to benefit from E-CPR. Another huge area for development is ECMO in the cardiac catheterization laboratory.<sup>25,28,29</sup>

Interventional cardiology and minimally invasive cardiac procedures have revolutionized the care of cardiac patients. Initiation of VA ECMO prior to, during, or after PCI is likely to increase with more complex patients and higher expectations of the public. Cardiac ECMO management poses several challenges. Echocardiography is particularly useful, may reveal new or worsening pathology, and can help tailor management strategies.<sup>30</sup> Distension of left ventricle during VA ECMO is problematic and needs special consideration.<sup>31</sup> Another potential complication of VA ECMO is Harlequin syndrome.<sup>32</sup>

Although the VA mode still remains the primary mode of ECMO support in neonates, a steady rise in the use of the VV mode has been witnessed in the recent times.<sup>33-35</sup> The physiological principles of management on ECMO are well established; however, improvement in ongoing care is attributed to the advanced research in the field of ECMO.<sup>8,36</sup>

Controversies and important questions still exist in certain aspects of care like best agent and tool to monitor anticoagulation,<sup>22</sup> prognostication and long-term outcome,<sup>33</sup> and modality to provide renal support therapy. Criteria for ECMO in neonates with congenital diaphragmatic hernia still remain an inexact science.<sup>37</sup> Owing to significant improvements in neonatal clinical care and innovation of novel therapies for the primary diseases, ECMO is finding its way in previously unexplored indications and in clinical

situations considered as absolute contraindication in the past. In 2008–2012, the ELSO registry documented that 178 patients with malignancy received ECLS, which equates to 1% and a doubling of utilization compared with that reported previously. This is attributable to the significant improvement in five-year survival (>80%) for childhood cancers.<sup>38</sup> A particular aspect, underrepresented in the literature, research, and training, is mobile ECMO. ECMO patients represent the extreme of pathophysiology and moving them adds increased risk, and hence requires meticulous planning, competent personnel, checklists, and attention to details to ensure patient safety. ECMO is often located in specialized regional centers, thus necessitating moving patients.<sup>39,40</sup> As yet, no consensus exists on optimal team composition, and specific roles vary considerably between centers. Whatever the configuration, the mobile ECMO team should have the necessary skills and competency to safely initiate, maintain, and trouble shoot any ECMO or clinical emergency.<sup>12</sup> They should be self-sufficient and ensure adequate supply of all ECMO-specific equipment and have adequately trained personnel, appropriate vehicles, equipment, and medication.<sup>41,42</sup> Incorporating the Ambulance Service professionals into the team to provide seamless team dynamics during retrieval may significantly contribute to improving mobile ECMO

safety. Intensive or Critical Care Paramedics (CCPs) can play a logistics and safety role, allowing other members of the team to focus on their specific duties. CCPs are experienced in advanced airway, ventilation, and advanced cardiovascular life support (ACLS) skills, providing the team with additional skills in the event of an emergency.<sup>43</sup> One of the key aspects in preventing patient safety issues and minimizing risks of harm during the transportation of an ECMO patient is to develop a well-prepared multiprofessional team. Mobile ECMO simulation can play a very important role in developing not only core skills but also enhance general team dynamics<sup>5,6</sup> (Figure 1).

Of increasingly recognized importance to improve the quality of care and improve patient outcome is the involvement of other allied healthcare professionals into the ECMO team such as physiotherapists and perfusionist.<sup>44,45</sup> They complement the key role played by the critical care nursing staff who have acquired expert knowledge and skills and become ECMO nurse specialists who can integrate the operation of the ECMO machine, ventilatory requirements, and patient's medical management.<sup>21,46,47</sup> They fulfill an increasing number of responsibilities in the multiprofessional team. Each ECMO center needs to create their own program-specific indications, team structure and composition, and management strategies, including



**Figure 1.** ECMO team taking part in a truly interprofessional simulation-based training activity with the purpose-designed ICU ambulance and ECMO stretcher (picture courtesy of Hamad Medical Corporation).

clear exit plan after taking into consideration the available resources, and ethical, religious, and cultural aspects of their specific environment.<sup>48</sup> We hope that this new collection of articles and abstracts will contribute to the advancement of ECLS therapies worldwide and development of expert teams who

safely acquire the required skills and knowledge using various simulation modalities.

Keywords: ECLS, Qatar, ELSO SWAC 2017, ECMO

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