EXTRACORPOREAL LIFE SUPPORT ORGANIZATION

2020 ANNUAL REPORT

Our Mission and Vision

Mission Statement

To provide support to institutions delivering extracorporeal life support through continuing education, guidelines development, original research, publications and maintenance of a comprehensive registry of patient data.

Vision Statement

ELSO will be the premier organization providing education, training, research, and data management for the advancement of extracorporeal life support throughout the world.

ELSO's Guiding Principles

Innovation: Seeking to identify and promote advances for the application of extracorporeal therapies.

Expertise: Bringing together world leaders in the care of critically ill patients for collaboration to advance quality of care through education and publication.

Clinical Support: Maintaining a comprehensive registry of data to assist in reducing morbidity and improving survival of patients requiring extracorporeal therapies.

Community: Fostering communication and collaboration among professionals who apply advanced technologies in the treatment of refractory organ failure.

A Message from ELSO President Matt Paden, MD

"Just as the constant increase of entropy is the basic law of the universe, so it is the basic law of life to be ever more highly structured and to struggle against entropy." – *Vaclav Havel*

Change is constant. No year in recent memory reflects that more than 2020. Our plans in January for the year bore little resemblance to what actually occurred by the end of the year. This was true for me personally, professionally, and as well for ELSO as an organization.

This first annual report for ELSO contains many of the achievements, past and present of our organization, but I want to focus this section on the individual acts of our members during this past difficult year.

While 2020 has been full of challenges we never expected, it has been truly inspiring to see all of the literal intensive care at the bedside that you all have displayed. As always, the patients and families came first, and you have shined providing the most technologically advanced therapies to the sickest and most unstable patients in the world. All of this during a pandemic, with resources strained like never before. While providing ECMO is our job and our passion, and what we do each day - pause for a moment to realize that this year thousands of additional people survived because of your care. Equally important was your care for those who died. You were there to comfort families, or more often than we would have liked due to quarantine restrictions, BE the family for that patient. In both of these settings, you made a difference.

As the ELSO community, the care you provided each other was equally as inspiring. As the pandemic sprawled across the world, the amount of real time information sharing was astonishing. Our video chats were filled with people from all over the world – sometimes to report new findings, sometimes to learn, sometimes to comfort, and sometimes to grieve. One message came through very clearly – while these things are difficult, we will do them together and support each other through it.

I am speaking of all of this as if it is in the past, but we all know it still continues. With the approval of multiple vaccines, my hope for 2021 is that they will start the gradual steady elimination of this pandemic. While I want to see COVID-19 in our past, I also want the intensive care you have provided for patients, families, and each other to continue. They, and we, are going to need it. We will undoubtedly have challenges in 2021, but we will handle them together, and will succeed.

The core values of innovation, selflessness, and community that Bob Bartlett built ELSO upon, was clearly on display for the world to see in 2020, and I could not be more proud to be a part of it. So pause for a moment, reflect on all that has occurred, hug your family extra tight, and go forth to serve those who need you in 2021. Undoubtedly more change is coming.

Matthew L Paden, MD
President, ELSO

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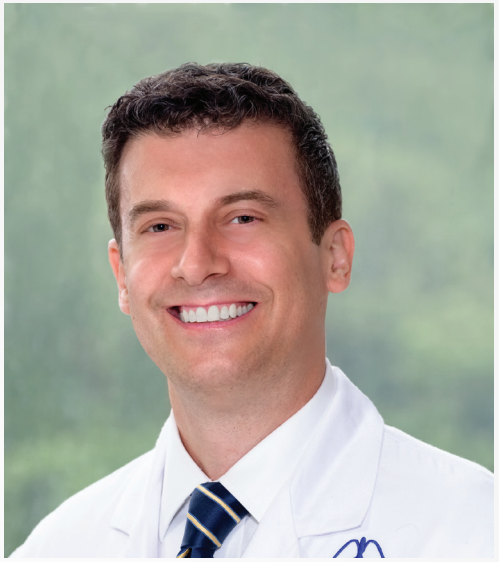
ELSO Board of Directors






ELSO's Board of Directors for 2020 - 2022

Top Row: Matthew Paden, President; Mark Ogino, Past-President; Daniel Brodie, President - Elect; Peta Alexander, Treasurer

Bottom Row: Graeme MacLaren, Global Representative; Robert Bartlett, Founder, Emeritus Board Member

ELSO Global Chapter Chairs

Jan Belohlavek, EuroELSO; John Fraser, AP ELSO; Leonardo Salazar, LA ELSO; Yatin Mehta, SWAAC ELSO

ELSO Steering Committee

Top Row: Cara Agerstrand, Conference; Ryan Barbaro, Registry; Bishoy Zachary, Education; Justin Sleasman, Perfusion Liaison; Jonathan Haft, Technology & Innovation.

Bottom Row: Darryl Abrams, At Large; Lakshmi Raman, Publications; Jenelle Badulak, Nominations & Membership; Bradley Kuch, RT Liaison; Eddie Fan, Research

Not Pictured: Tracy Morrison, Quality, Guillermo Herrara, Coordinator Liaison

Our History

Extracorporeal Life Support (ECLS, ECMO) is a medical technology which uses mechanical devices to replace heart and lung function during severe heart and lung failure, allowing time to diagnose and treat the cause of heart and lung failure. ECMO was developed in the 1960s, based on membrane oxygenators which allowed extracorporeal circulation for days. The first clinical cases were in the 1970s. These cases demonstrated that ECMO could keep patients alive long enough for the native hearts and lungs to recover.

Throughout the 1980s, extracorporeal life support (ECMO) was being studied and developed in a few major medical centers, primarily in the treatment of neonatal respiratory failure. Many of these centers contributed to a registry of ECMO cases and the first 700 neonatal cases were published in 1988. This led to the establishment of the Extracorporeal Life Support Organization (ELSO) in 1989. The goal of ELSO was to establish a consortium of clinicians, scientists, and health care administrators to study this new technology. ECMO is based in hospital intensive care units, and membership in ELSO is primarily by medical center. The charter meeting was held in Ann Arbor in September 1989.

Fifty-five medical centers from the United States, Canada, and four other countries were represented at the charter meeting, October 1 - 3, 1989 in Ann Arbor, Michigan.

Fifty-five medical centers from the United States, Canada, and four other countries were represented at the first meeting. At that meeting, the administrative, scientific, and educational components of ELSO were established. The initial Steering Committee established the charter and bylaws. The structure included six major committees: Registry, Logistics and Education, Devices and Techniques, Communications, Conference, and Protocols. This organizational structure has served ELSO very well over the ensuing 30 years. For the first two decades, ELSO was administratively housed in the University of Michigan as an academic program within the Department of Surgery.

In 2013, ELSO was established as a free standing nonprofit corporation. The governance structure was modified to establish an Executive Committee in addition to the overall Steering Committee. The Executive Committee consisted of the president, president-elect, immediate past president, treasurer, and a member representing one of the ELSO chapters. With the establishment of ELSO as an independent nonprofit organization, the arrangements with the University of Michigan were gradually phased out. The office was originally managed by Phoebe Hankins. In 1996, Peter Rycus was appointed as Executive Director. In 2020 Christine Stead was appointed CEO of ELSO, as the organization became a major global health care enterprise.

Our History - Continued

ELSO has always been a worldwide organization. In 2011, ELSO chapters were established on other continents. The first EuroELSO chapter was held in Rome in 2012. In 2013, the first meeting of the Asia-Pacific Chapter was held in Beijing. In 2014, the first meeting of the Latin American Chapter was held in Cancun and the Southwest Asia Chapter was held in Abu Daube. The chapters have developed into major organizations in these other continents. All members contribute to the Registry and the other activities of ELSO.

The mission statement of ELSO is: To provide support to institutions delivering extracorporeal life support, through continuing education, guidelines development, original research, publications and maintenance of a comprehensive registry of patient data.

The primary activity of ELSO is management of the ELSO Registry under the direction of the Registry Committee. The Registry now has more than 130,000 patients. Tracking the types of patients in the Registry describes the growth of ECMO technology from newborn respiratory failure to respiratory and cardiac failure in children and adults. The Registry documents exponential growth of ECMO activity beginning in 2010. This growth was related to new safer, simpler devices, important clinical research studies, and the successful use of ECMO in the 2009 worldwide pandemic of the H1N1 influenza.

The Registry was critical in establishing the value of ECMO in the 2020 COVID-19 pandemic. The patients entered into the Registry are currently about half cardiac and half respiratory with the major growth in adult cases. The status of the Registry includes all electronic data entry and data processing. Each center can track their own results compared to similar centers, establish benchmarks, and identify best and worst practices. The reports of the Registry are reported regularly, including many specialty papers based on Registry data. The major reports of the Registry are published periodically in the ASAIO Journal.

The Registry is used by medical industry and regulatory agencies to document the safety and efficacy of ECMO in specific patient populations. Analysis of the Registry leads to recommendations and policies which are disseminated as the standard ECMO text book (The Red Book), practice guidelines, hands -on and on-line courses, benchmarking, and quality validation in centers.

ELSO provides advice on establishing ECMO programs, training ECMO physicians and specialists, economics, and quality maintenance and improvement. ELSO member centers which meet criteria can be certified as Centers of Excellence. That certification is recognized by health care payers such as Medicare and quality organizations such as the Joint Commission.

ELSO supports education and implementation of ECMO in critical care by partnering with other professional societies such as SCCM, ATS, AATS, STS, APSA, APA in the US and similar societies worldwide.

ELSO has become the primary source of education, certification, and recording of extracorporeal life support throughout the world. Extracorporeal life support has become a routine clinical activity in critical care. The role of ELSO is to document that activity and to support improvement in the practice of extracorporeal life support.

Robert H. Bartlett, MD
Founder, ELSO

A Message from the Founder of ELSO

ELSO began in 1989 as a small group of clinicians and researchers interested in documenting and studying a new technology called extracorporeal membrane oxygenation (ECMO). Over the next 30 years ECMO has become standard practice in critical care worldwide. We communicate with each other in annual conferences, and with the world by publications in the medical literature. However, this is the first year we have prepared an annual report. This report is intended for the ELSO members, but also for the broad critical care community, health care administrators, medical industry, and most importantly our patients. That 30-year history is summarized in this booklet.

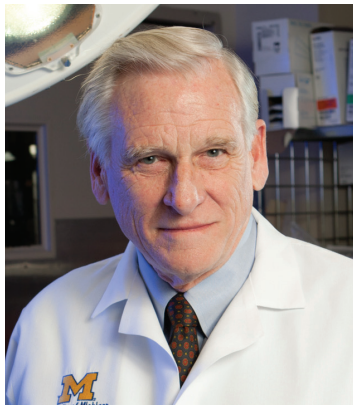
It is most appropriate to initiate the annual report this year. 2020 was the year of the global COVID-19 pandemic. It affected the life of everyone on the planet. Millions of people contracted the virus and millions died, primarily of pneumonia. Hospitals were overwhelmed with patients. Would ECMO be effective in saving moribund patients? Could complex ECMO even be considered in overloaded ICUs? In a few months ELSO answered those questions, all due to coordinated data collection through ELSO. ECMO saved 50-60% of COVID-19 patients who failed all other treatment. ELSO provided regular guidelines on when, who, and how to manage ECMO in the highly contagious infection. The infrastructure was in place in hundreds of ELSO centers around the world. That experience is included in this report.

Like every professional organization, in 2020 communication, conferences, and education could not be conducted face to face. ELSO's annual conferences were conducted completely on-line. Approximately 12,000 people attended the annual ELSO Conference. The registry report on COVID-19 was presented. All aspects of ECMO progress and patients were presented in a way that is not possible at an in-person conference. A summary is presented in this report.

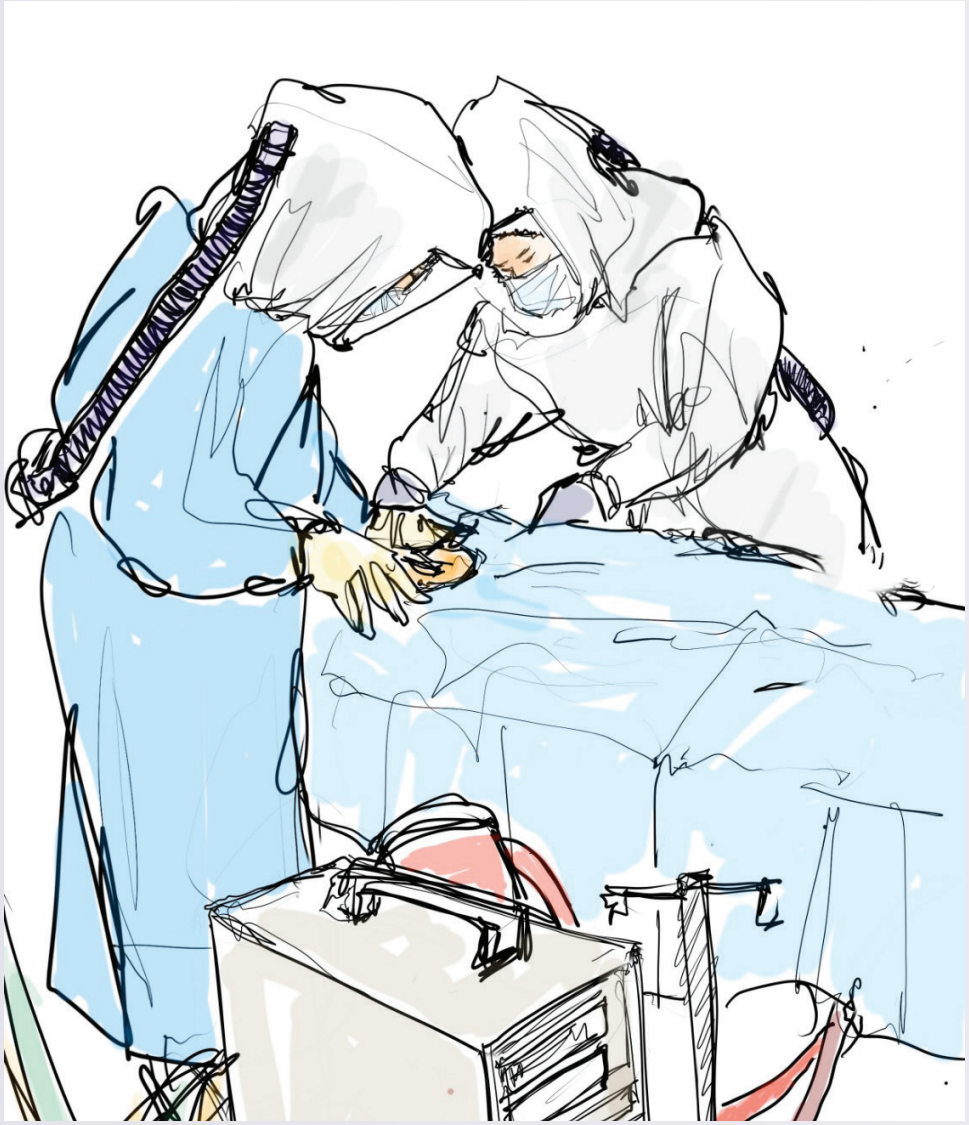
2020 was the year that ELSO grew from a small group of specialists to the major global voice in ECMO practice, policy, and certification. Actually, that had been going on for ten years with the establishment of ELSO chapters on 5 continents, publication of the standard text, and educational programs. But in 2020 the structure and governance of ELSO moved from that of a small interest group to a major scientific and policy organization, headed by the CEO, Christine Stead. The new administrative structure is described in this report.

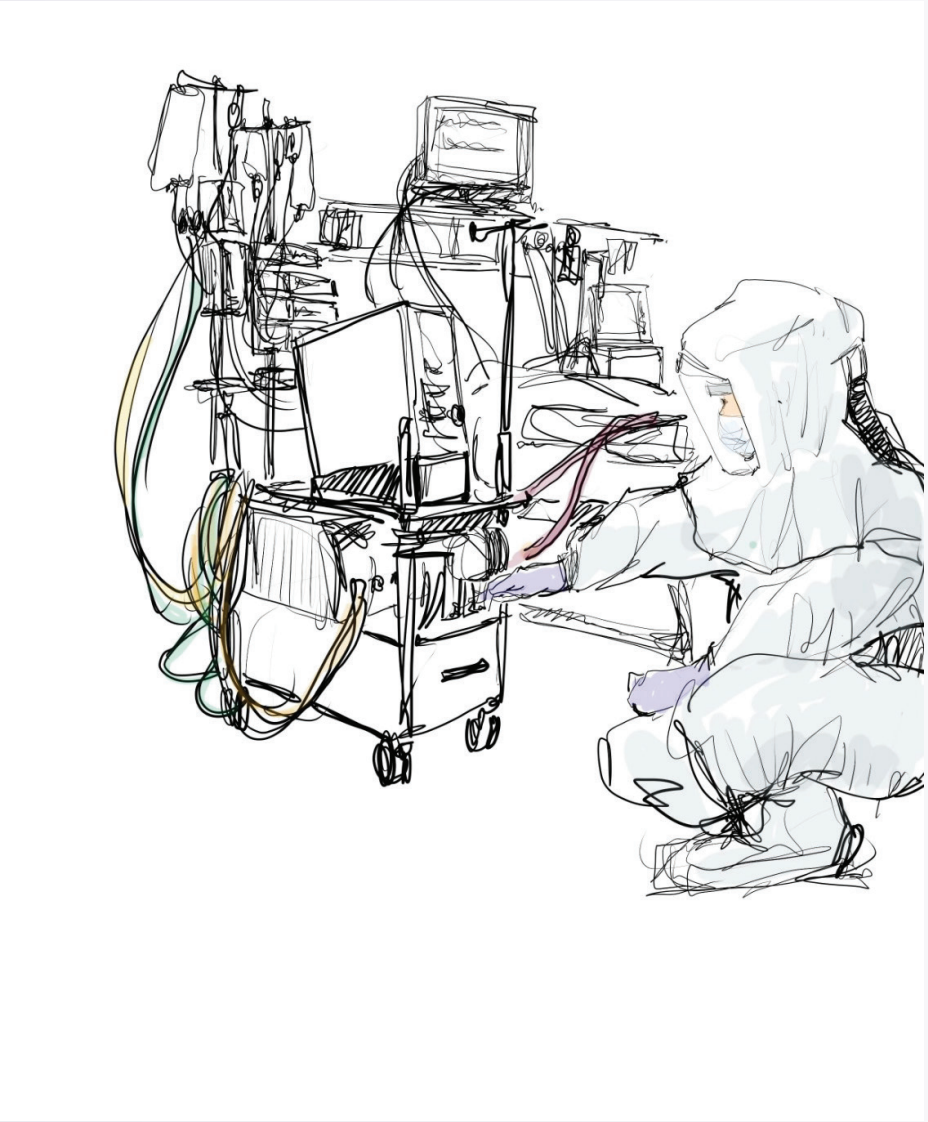
This report is a thorough description of what ELSO is and did in 2020. We hope you find it informative, helpful in your practice and profession, and maybe a little inspirational as you review the patient stories.

Robert H. Bartlett, MD
Founder, ELSO



Reflections From the Pandemic





ELSO would like to thank and acknowledge the artist Young-Jun Oh for his inspirational depiction of care and the experience of the critical care teams during the COVID-19 pandemic. Young-Jun Oh is an ICU nurse in Incheon, South Korea. Artwork is featured with his permission.

ELSO's COVID-19 Response

COVID-19: It was the topic of 2020. The pandemic brought us closer together as a global community. We all watched as our colleagues in Wuhan had the very first experience with the virus, and the first application of ECMO to treat COVID-19 began. With their generosity in sharing their experience, our community learned faster from each other across the world.

Communication

ELSO's efforts began with real-time communication among colleagues to share the early experiences of COVID-19 on ECMO. Our ELSO community is built on a culture of collegiality, support, and knowledge-sharing. Communication channels across ELSO grew: 24/7 chat groups, discussion boards, webinars, capacity maps, surveys, and studies – among them. ELSO developed a webpage to coalesce all COVID-19 related resources, including links to social media sites, media coverage, select scientific papers, and important collaborations.

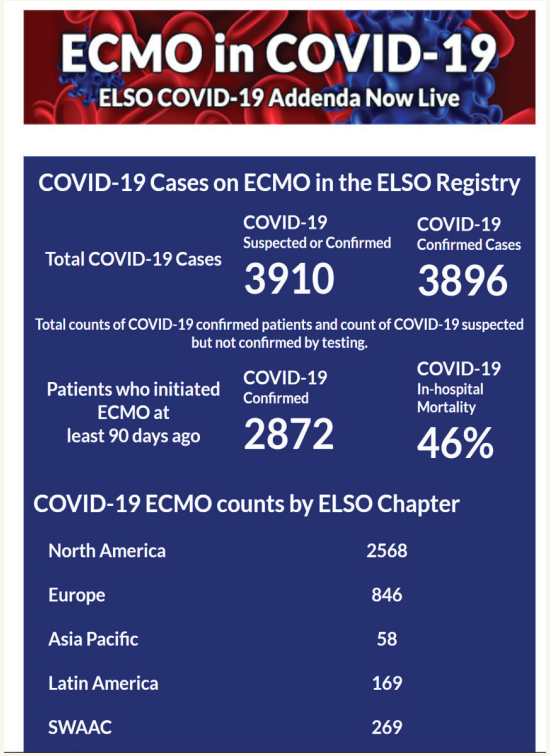
ECMO Availability Map

ELSO launched the ECMO Availability Center Map during the first wave of the pandemic as a quick visual for where capacity exists. Many factors drive ECMO availability. As an organization, we wanted a simple way for centers to see where capacity might exist as demand increased. The quality of the data is reflected in the date stamp for each status update provided. Heading into 2021, more centers are using this tool to coordinate access to ECMO care in their region.

Data – Live COVID-19 ELSO Registry Dashboard

ELSO created a live COVID-19 dashboard as an addendum to our ELSO Patient Registry. In doing so, we changed our data submission process, asking all ELSO ECMO Centers to enter their COVID-19 patient data in real-time versus our typical process of data submission after patient discharge from the ECMO Center. Thankfully, many member centers responded.

ELSO maintains the largest ECMO patient registry in the world, with ~135,000 cases in the registry. During this pandemic, we are able to share the ECMO experience in COVID-19 with our global community. This is critical for studying the disease and the optimal application of ECMO for patients to achieve better outcomes.



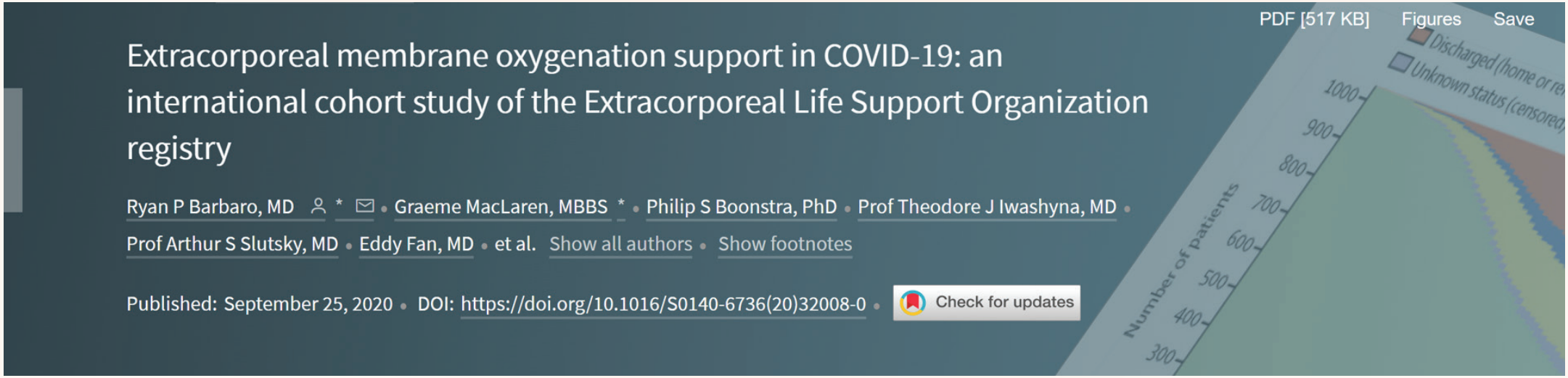
ELSO Registry COVID-19 Experience – Lancet Publication

In September, the experience of ELSO's first 1,035 patients was published in The Lancet, showing a 37% in-hospital mortality rate from 36 countries; similar to non-COVID-19 patients with ARDS experience from other trials. ECMO can be an effective treatment for COVID-19 in select patients.

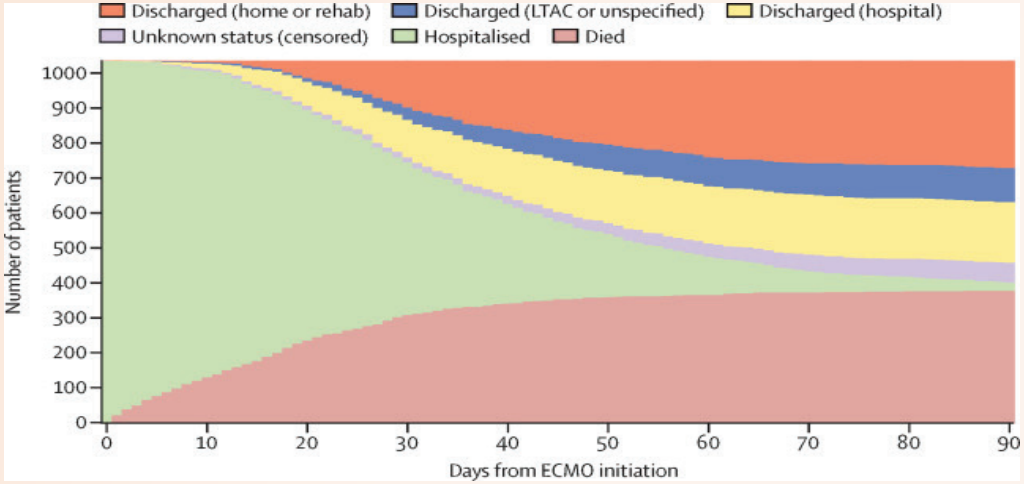
"At the beginning of the COVID-19 pandemic, the role of ECMO was unknown. In response the international ELSO community began collecting and sharing real-time high-quality data through the ELSO Registry," said Ryan Barbaro, MD, Chair of ELSO's Registry Committee and lead author of the study. "The results of this study are a witness of those efforts and the findings support recommendations to consider ECMO when lung protective ventilation fails."

Among the 1,035 eligible ECMO-supported patients with COVID-19, with 67 (6 percent) remaining hospitalized at the end of the study period, the estimated cumulative incidence of inhospital mortality 90 days after the initiation of ECMO was 37.4 percent. The mortality rate was 39 percent (380/968) among those with a final disposition of death or hospital discharge.

The results support current recommendations that centers experienced in ECMO should consider its use in refractory COVID-19-related respiratory failure. ELSO wants to thank all of our contributing centers that continue to contribute to the ELSO registry, especially those that changed practice to enter data in real time for COVID-19 patients.



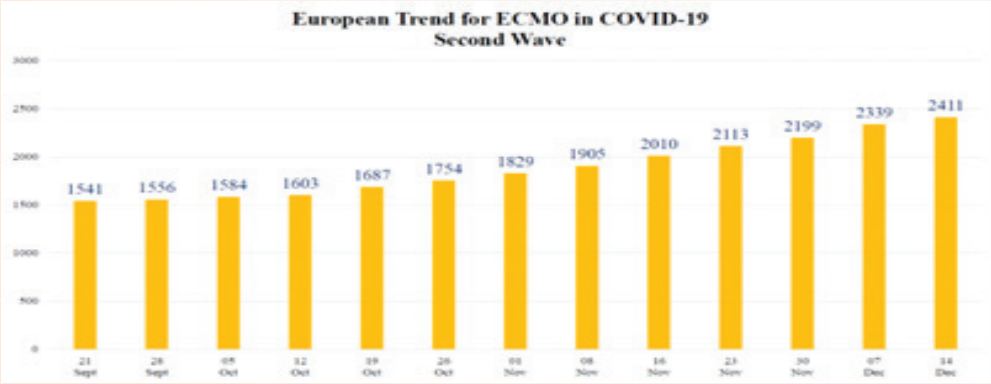
Outcomes of 1,035 Patients in ELSO's COVID-19 ECMO Registry



ELSO COVID-19 Research Collaborations & Efforts

EuroELSO Survey

Early in the pandemic, as the European region was impacted by a surge in demand for services, our EuroELSO Chapter launched the EuroELSO Survey. This survey was open to any ECMO center to share COVID-19 patients treated with ECMO. The survey played an important role early on to help change perceptions of the effectiveness of ECMO in COVID-19. Data continues and shows over 2,400 ECMO COVID-19 patients in the region to date.



COVID-19 Critical Care Consortium

John Fraser, Chair of AP ELSO, launched ECMOCARD early in the pandemic. ECMOCARD is now more inclusive to include COVID-19 patients requiring critical care. This is a global consortium, with ELSO, Oxford University, and University of Queensland as sponsoring organizations.

Since its inception, over 56 countries participate in this consortium, contributing approximately 4,000 patients to the database. There are several areas of investigation that will further our knowledge on COVID-19 in respiratory, cardiac, neurological, and other areas.

In addition, IBM has joined this effort as a partner to change clinical practice by bringing real-time data to provider's fingertips through a Sankri format dashboard, allowing providers to see experience from centers around the world in real time. An overview of the dashboard can be viewed here: https://www.ibm.com/case-studies/critical-care-consortium/?social_post=4322910140&linkId=107238994

COVID-19 Critical Care Consortium
Incorporating ECMOCARD

ELSO's COVID-19 Guidance and Guidelines for Use of ECMO During the Pandemic

ELSO is updating our COVID-19 Guidelines, which will be posted here, along with all other COVID-19-related content: https://www.elso.org/COVID19.aspx

ELSO issued initial guidance early during the pandemic to provide recommendations on the use of ECMO in COVID-19 patients. Guidance from ELSO included initial criteria for ECMO access consideration as resources became more constrained.

ELSO's Guidelines address important factors relating to ECMO care for COVID-19 patients, including:

- ECMO program organization at the country, regional, and institutional levels
- Patient selection and timing of ECMO initiation
- Indications and contraindications for ECMO use
- Cannulation strategies
- Ongoing care: respiratory and ventilator management; hematological; gastrointestinal; mobility; monitoring; and procedures during ECMO
- ECMO transport
- Decannulation
- Ethical considerations
- Infection control and staff safety measures.

ELSO's Initial COVID-19 Guidance can be foud here:
https://pubmed.ncbi.nlm.nih.gov/32243267/

Guidelines can be found here:
https://pubmed.ncbi.nlm.nih.gov/32604322/

We anticipate an update to be released early in 2021. All ELSO COVID-19-related publications can be found here:
https://www.elso.org/COVID19.aspx

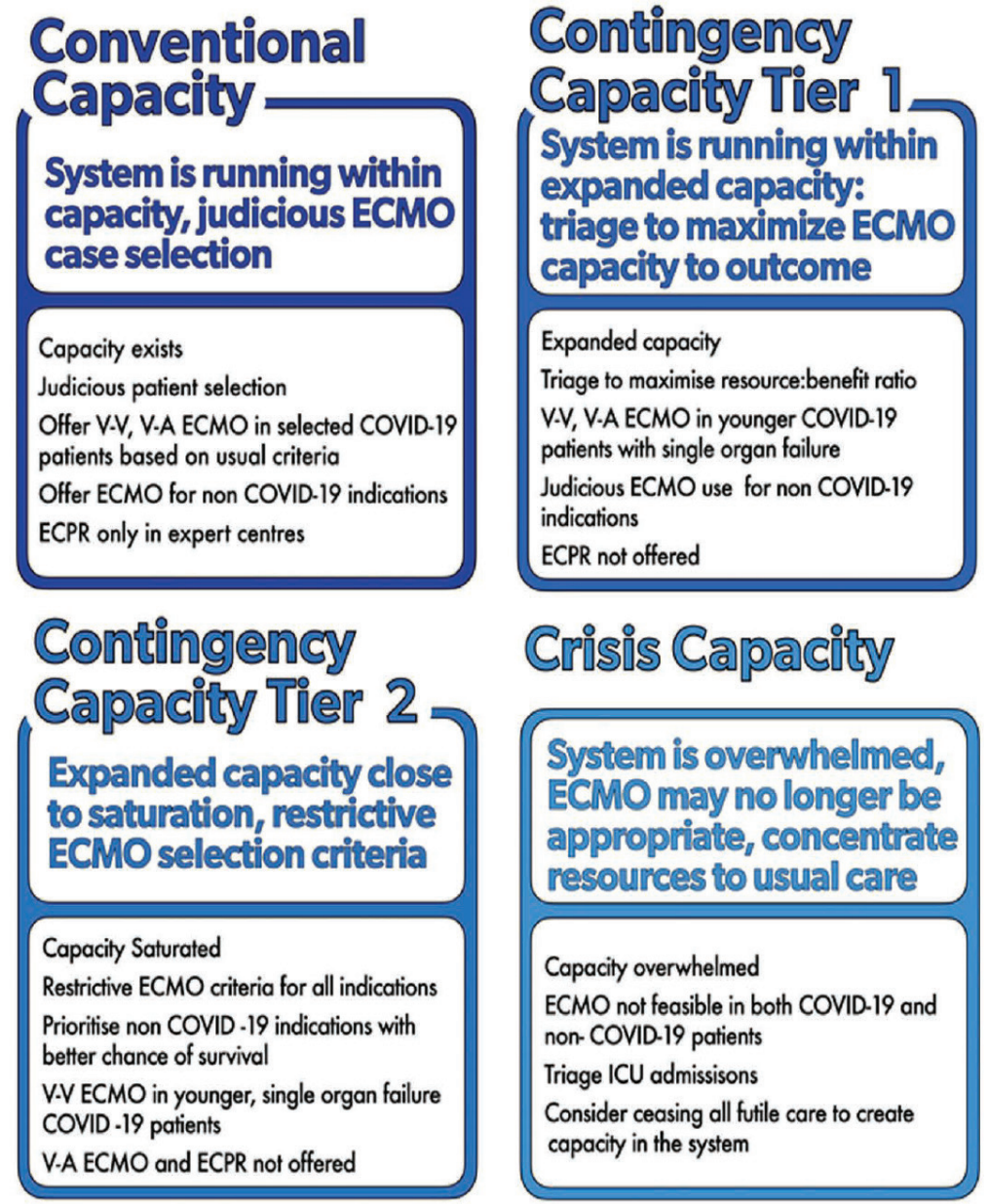


Figure 2. ECMO provision based on system capacity. COVID-19, coronavirus disease 2019; ECMO, extracorporeal membrane oxygenation; ECPR, extracorporeal cardiopulmonary resuscitation; ICU, intensive care unit; VA, venoarterial; VV, venovenous.

ELSO COVID-19 Webinars

Webinars became an important means of sharing knowledge during the pandemic. While not unique to ELSO, it was new for ELSO and aligned with our culture and commitment to collaboration on a global scale. As the pandemic moved across the globe, we highlighted different experiences, lessons learned, team members and the importance of data.

ELSO expanded our capacity to host webinars, as we quickly exceeded our online platform. We amplified the opportunity to participate through global social media channels and, during webinars, use of YouTube Live and Facebook Live. Several webinars had thousands of participants. There was a need to share information quickly through data, experience, case studies, and other information.

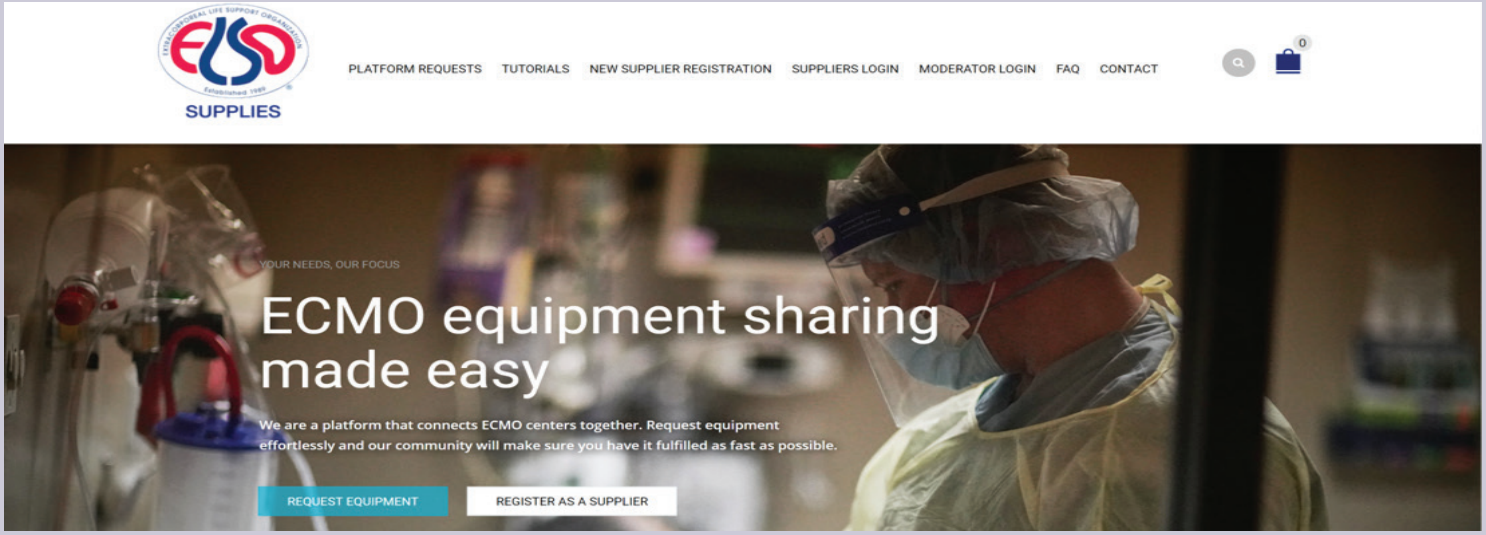
We were grateful for the teams that helped to share critical information in a quickly evolving environment while many saw a surge in demand for care that was strenuous. Still, practitioners from all over the world came together to share what they knew for the benefit of those that had yet to face the pandemic.

This course is offered in 2021; similar to the one offered in November 2020.

ELSO Supplies Exchange

Throughout the pandemic, ELSO members shared struggles with obtaining adequate ECMO equipment, often in areas particularly affected by the pandemic. As we became aware of these challenges, a team worked with ELSO to develop the ELSO Supplies Exchange. This will be available in January 2021. As with so many collaborations that arose from the crisis the pandemic presented, we have so many colleagues and friends to be grateful for: our development team based on Qatar: Abdullah Alsalemi, Mohammad Noorizadeh, Mohamed Hassan Kamel Hassan Rabie, Ula Hijawi; our team lead, Justin Sleasman from Stanford Children's and the team of health systems that beta tested this on the US West Coast over the recent months; and our technical support team at IGD Solutions, led by Steve Hyer.

This supply clearinghouse will allow centers to exchange equipment in a unique time of need, such as a pandemic. It is not meant to replace normal supply chain operations, nor are there financial transactions as part of the exchange. Tracking and coordination with FedEx is integrated into the solution. We hope there is not much of a need for this going forward. But if there is, our centers will have another means to do their best to provide ECMO to patients that may benefit.



ELSO Equipment Survey

In 2021, ELSO will release the results of our equipment survey. Thank you to the hundreds of centers that participated in the survey. Your experience will help us advocate for our centers, work better with our industry partners, and with regulatory agencies.

ELSO's 31st Annual Meeting

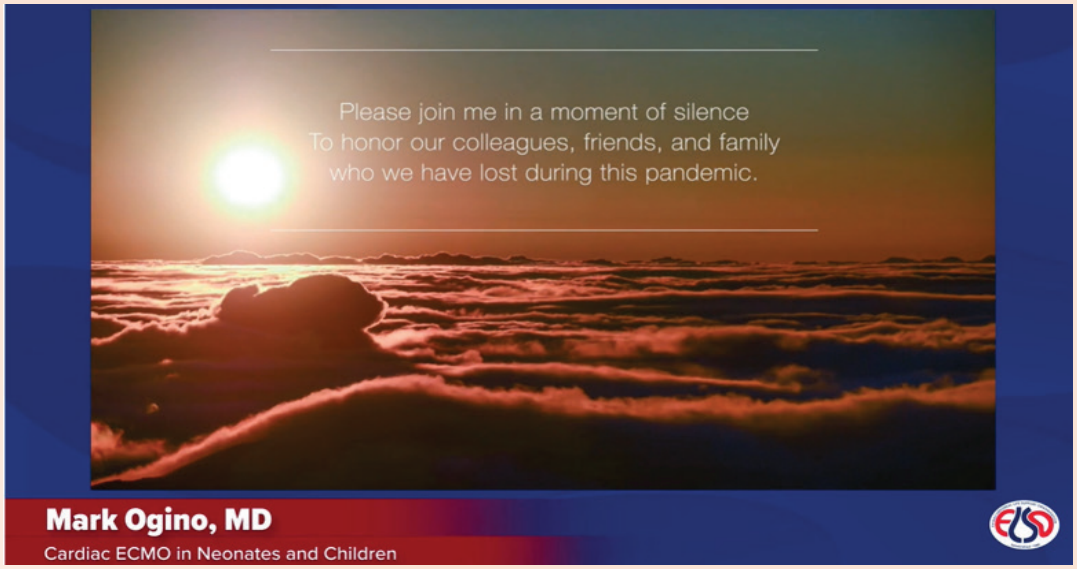
We were as uncertain as many were when we had to move our venue from Hawaii to a virtual platform. As a global nonprofit whose members had been treating very sick COVID-19 patients for months, we especially appreciated the need to share information and do so in as inclusive a manner as possible. We understood that people and health systems were under enormous personal, mental, and financial constraints. This inspired us to make the meeting free for participants, with an option to obtain CME.

We did our best to bring Hawaii into the virtual experience. To our very pleasant surprise, participants joined us from our around the world, with ~12,000 registrants; 45% from outside the United States.

Another virtual program benefit is that the content remains available to our members here. If you missed a presentation, please access it whenever you like.

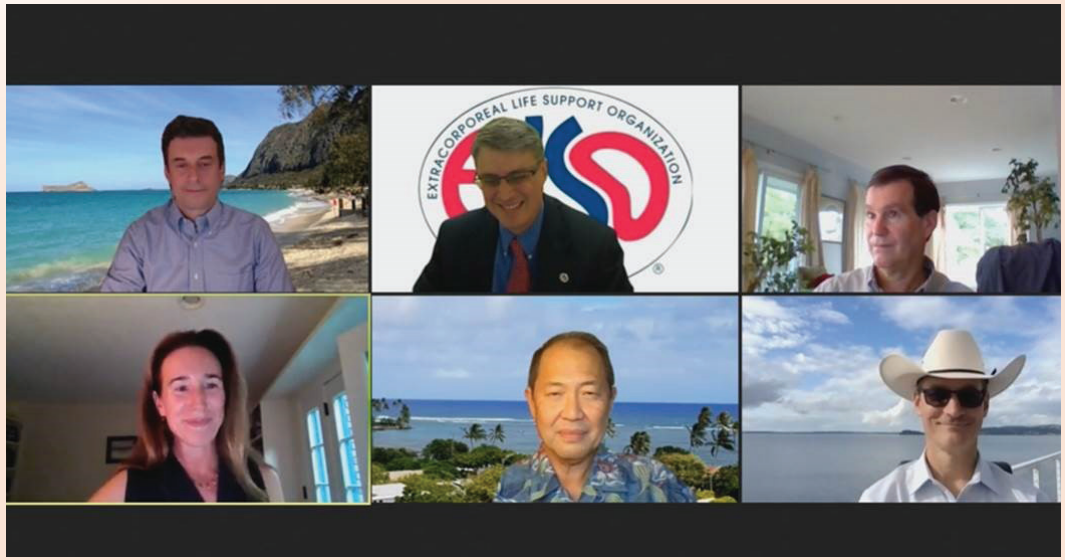
COVID-19 made us all shift faster toward things that may have seemed like a huge change previously. The ability to engage our global community is an access benefit we heard resounding support for from our members. Thank you for making the time to join us. We appreciate our growing ELSO family!

pening Plenary ELSO on Vimeo.



A special thank you to our 153 speakers, staff, and partners for making this a success! Importantly, our industry partners rose to the occasion to make this event more possible and we couldn't do this without your support. Thank you.

ELSO President Transition: Outgoing President Mark Ogino Congratulates Matt Paden, ELSO's Incoming President.



Dan Brodie, MD, President-Elect; Matt Paden, MD, President; Peter Rycus, MPH, Executive Director; Christine Stead, MHSA, CEO; Mark Ogino, MD, Past President; Mike McMullan, MD, Outgoing Past President.

Education - A Big Year Ahead!

2020 was a big year for ELSO's education team. ELSOed and ELSO Academy were announced at the 31st Annual Meeting. ELSOed is ELSO's education team, instrumental to the development of educational content and the team that helps deliver training programs, webinars, and courses.

ELSO is developing several educational programs and a certification exam. These fall under the umbrella of ELSO Academy, which is a roadmap for navigating your learning path with ELSO.

ECMO 101 was launched in 2020, a great beginning orientation to ECMO and intended for early-stage educational programming for those just learning about ECMO.

In 2021, ELSO will launch our Online ELSO Course, which is in development and designed to make our didactic training available at your convenience. The online course is intended for those more familiar with ECMO and provides the in-depth didactic course that ELSO provides in our 5 day program of didactic and simulation training.

We are excited to launch ELSO's Individual Certification Exam in January 2021. This will be the premier ECMO certification, reflecting a multidisciplinary approach from the world's leading ECMO practitioners. Our partner, ExamSoft, conducts the US Bar Exam; providing a high academic integrety platform.

On-Site training options will return as soon as it is safe to do so, which we anticipate to be able to resume in 2021.

Virtual Courses

ELSO was able to keep education and training going this year through virtual courses. Training at your fingertips, on your time, in an accessible platform - this is an important part of the future of training. Necesarry during a pandemic; essential for busy clinicians. Access to education from world experts is a unique service ELSO will continue to provide to our global community.

Adult ECMO Training Course

In November, ELSO offered an adult ECMO training course that showed high demand for such a course. An advantage of the virtual environment is how many more can participate in such events. While this event was 'live', creating a time zone challenge, many from around the world participated.

ELSO is planning at least 3 of these courses in 2021: February, May, and November. In addition, we will be adding a Neo/Peds ECMO Training Course in March.

The ability to bring top practitioners into the virtual classroom is worth preserving and will likely continue to be an ELSO educational offering going forward.

Mobile ECMO Transport Course

More health centers became interested in providing mobile ECMO transportation services during the pandemic. The demand was high for such services, but not as readily available as needed.

In October, ELSO partnered with Hartford Healthcare to offer a pilot course on mobile ECMO transport for the Northeastern region of the US. Demand for this course was also high, so we offered the course to an open audience in December. We will continue to offer this course in 2021, with dates in March and May planned.

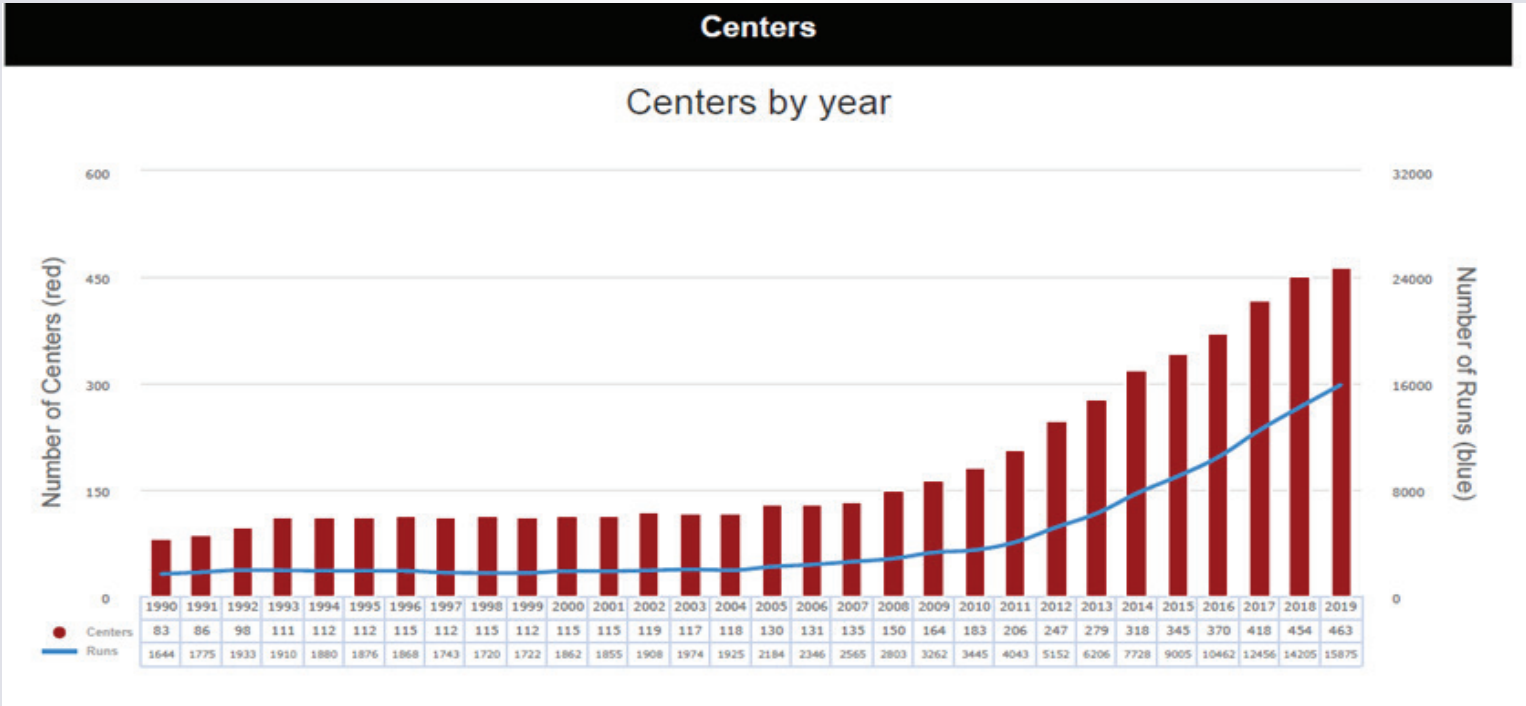
ELSO Registry

Live Data During the Pandemic: When the COVID-19 pandemic hit ELSO quickly created a COVID-19 addendum to the ELSO Registry and launched a live COVID-19 dashboard. This was the first time ELSO has broadcast live results. We believed real-time data was critical to inform our global community on the use of ECMO in COVID-19 patients.

A Focus on Quality: External data validation through audits is necessary to continually improve data quality in the registry. We initiated external validation of the ELSO Registry where an audit is performed on what a center inputs into the registry.

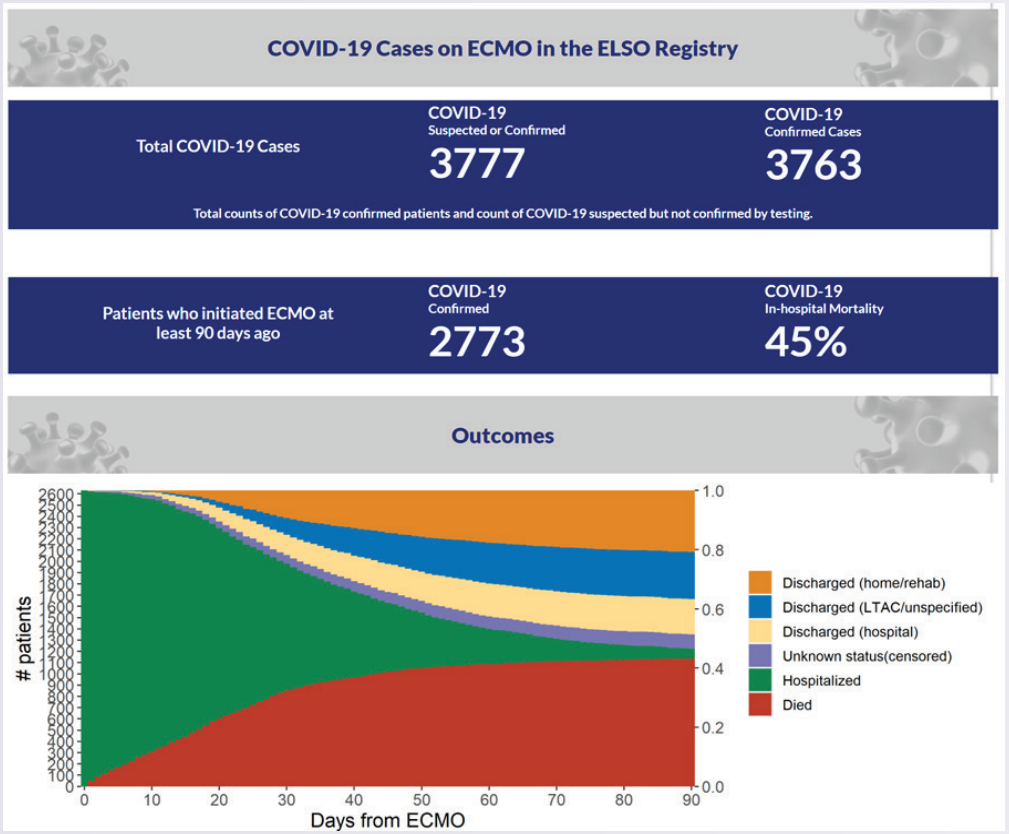
Other Major Improvements: We have updated the Quality Assurance Platform, added a new updated ECPR addendum, we are finalizing an updated Cardiac addendum, and enabled XML data import into the Registry. The XML import will allow centers to upload their data without having to do manual data entry. The Registry continues to collaborate with device developers and regulatory agencies to develop reports regarding ECMO related devices. We launched the ELSO Evidence Explorer, a device quality dashboard, for our industry partners.

ELSO hosts the world's largest ECMO patient registry, which began in 1989 and now holds ~135,000 patient ECMO runs. As the use of ECMO grows, ELSO's membership has also grown. The chart below shows the number of centers contributing to the ELSO Registry and the cases per year. We will have 2020 cases reported in our July update.



ELSO Registry - COVID-19 Live Dashboard

The live COVID-19 ELSO Registry Dashboard continues to play a role in sharing information on ECMO for COVID-19 patients. ELSO wants to thank all of the centers and those that have been able to submit data in real-time for the benefit of many. Thank you for your efforts!



COVID-19 ECMO counts by ELSO Chapter

	Still on ECMO	Still Hospitalized at ELSO Center	Total (n)
All ELSO	588	780	3777
North America	351	471	2465
Europe	143	180	830
Asia Pacific	18	22	58
Latin America	46	60	164
SWAAC	30	47	260

Reports counts of ECMO-supported suspected or confirmed COVID-19 cases by ELSO Chapter

Data reflects data from ELSO COVID-19 Dashboard on December 18, 2020.

ELSO Registry Results & Data Requests

Data Requests

One of the many benefits of joining ELSO is the ability to query the ELSO registry for either clinical decision making or for publication. In 2020 we have received 155 data requests of which 117 were for publication. For a list of approved data requests you can visit: https://www.elso.org/Registry/ApprovedDataRequests.aspx.

For simple queries not for publication but for decision making and general interest ELSO members can go to https://www.elso.org/Registry/OutcomeReporter.aspx.

Recent outcomes for all ECMO patient subgroups is shown below:

Overall Outcomes from 2015 to Present

	Total Runs	Survived ECLS		Survived to DC or Transfer	
Neonatal					
Pulmonary	4,072	3,361	82%	2,781	68%
Cardiac	2,574	1,837	71%	1,293	50%
ECPR	811	553	68%	359	44%
Pediatric					
Pulmonary	3,502	2,656	75%	2,321	66%
Cardiac	4,651	3,534	75%	2,756	59%
ECPR	2,350	1,344	57%	1,007	42%
Adult					
Pulmonary	17,460	12,211	69%	10,795	61%
Cardiac	20,055	11,931	59%	9,062	45%
ECPR	6,528	2,714	41%	1,948	29%
Total	62,003	40,141	64%	32,322	52%

Research

Our collective knowledge grew in 2020 at a fast pace. The SARS-CoV-2 virus and its disease inspired papers to be published at a faster pace than ever. ELSO had several important publications of this past year that are worth sharing here:

ELSO Registry COVID-19 Patient Outcomes

Many studies will continue to be conducted related to COVID-19 as the disease evolves and our understanding of it evolves.

ELSO contributes to the scientific knowledge through our registry and our global network of colleagues.

We will continue to highlight select scientific literature on our COVID-19 page while this is a predominant concern. In addition to our COVID-19 outcomes Lancet publication with global participation, we will share original studies and reviews related to this topic.

Please visit the Select Scientific Publications section of our COVID-19 page here:
https://www.elso.org/COVID19.aspx

ELSO Guidelines & Other Key Publications

ELSO is committed to providing guidelines for ECMO-related topics that reflect a global and multi-disciplinary view.

This year, ELSO produced several new guidelines, in varying stages of publication, including:

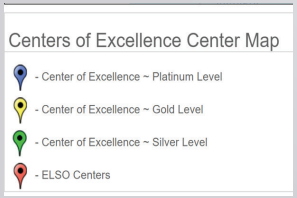
Guidelines for ECMO in COVID-19
Guidance Document for ECMO during Pandemic
Adult ECPR
Pediatric ECPR
Adult Respiratory Failure
Congenital Diaphragmatic Hernia
Neonatal Respiratory

ELSO continues to bring our global colleagues together for sound guidelines in areas of practice and management related to ECMO and ECLS.

ELSO will launch a new Research Committee in 2021. We are pleased to announce that this committee will be chaired by Eddy Fan, MD, PhD, FRCPC. Eddy will join the ELSO Steering Committee in this capacity. We are excited about this new committee and Dr. Fan's leadership.

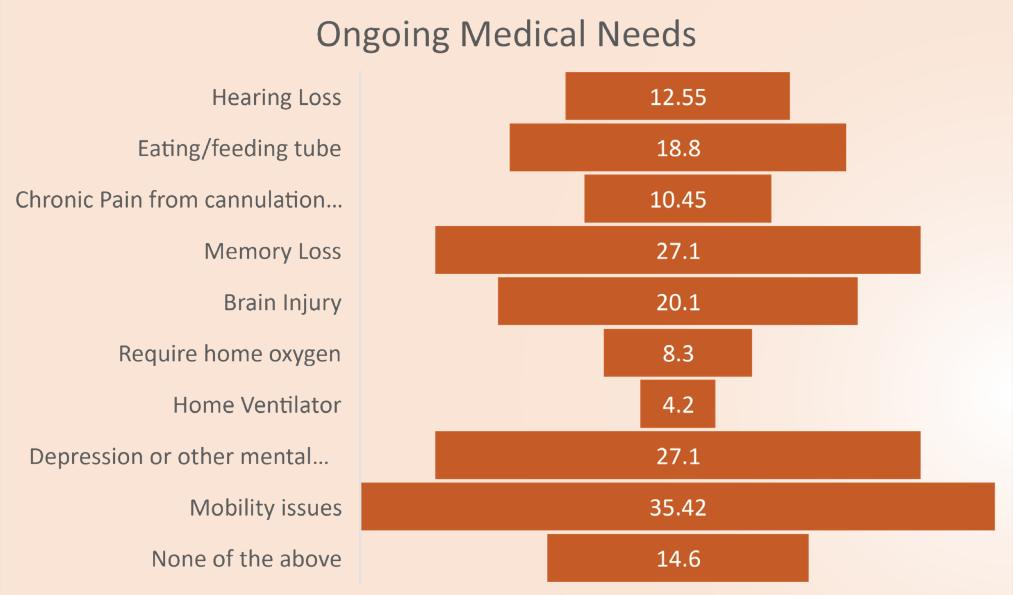
Centers of Excellence

ELSO is proud of our 80 Award of Excellence recipients in 2020! A map of our current AOE centers is shown below. The AOE is a prestigious award for ECMO Centers, signaling a commitment to quality, systems, patients and families, ongoing improvement, among other criteria. It is an effort to pursue award status. It is an honor to receive it. We look forward to working with our next cohort in 2021. For useful tips regarding evaluation criteria, please find the link here: https://www.elso.org/AwardofExcellence/BeforeYouApply.aspx. Congratulations on our 2020 cohort!



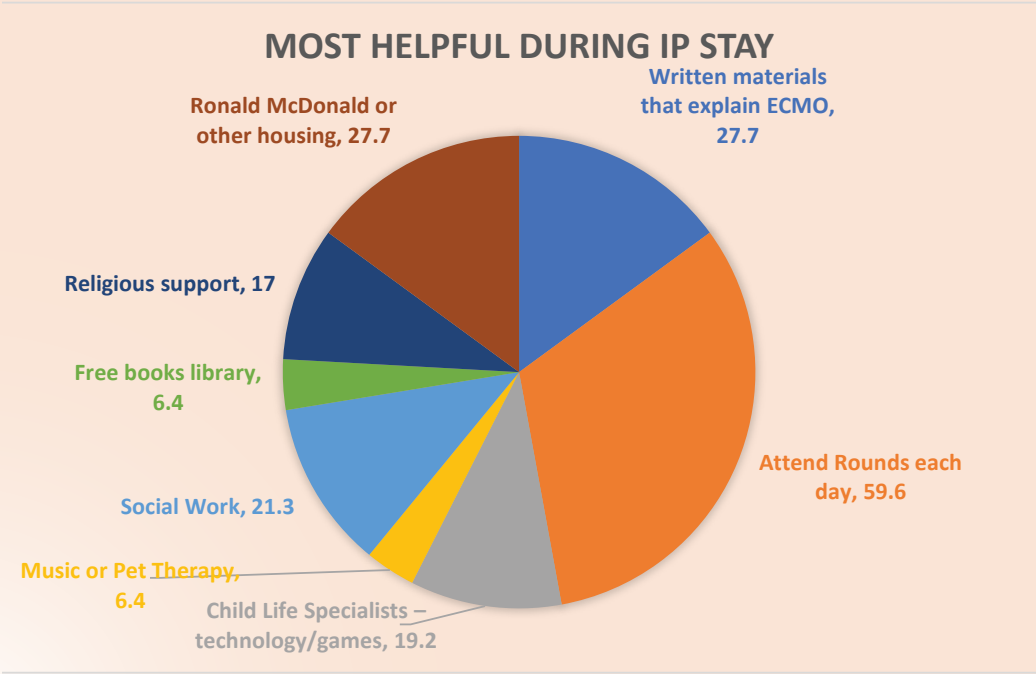
Patients & Family Support

ELSO is launching tools and services for ECMO patients, survivors, friends, and families. Always a tight community, ELSO began work in 2020 to understand what gaps in information, services, or support that are unmet. We surveyed this group to better understand the needs of the patient-related ECMO community. Several key findings:



While survey results reflects a limited data set, the feedback is still meaningful and we will be sharing more findings with our global ELSO community so you can incorporate improve your programs, including anticipating services needed once patients leave the hospital setting.

ELSO looks forward to working with patients and their families in 2021 to further explore what we can do as an organization to better support their needs. For anyone interested in joining this effort, please reach out to us. Elaine Cooley is leading the coordination of work for ELSO: ecooley@elso.org.



Attending rounds each day was, by far, the most helpful activity or resource that families appreciated during the inpatient stay.

ELSO was grateful to have several patients speak at our Annual Meeting, including Stephanie Pleuss, an ECMO patient as a teenager.

Patients' Perspective

Patient: Titou; shared by Amanda Macy, Titou's wife, March 2020

My husband who never gets sick started with a headache and fever on March 4, 2020. He and I had just returned from a quick weekend getaway in NYC. Managing with alternating doses of Tylenol and Ibuprofen and lots of fluids, by Friday, the fever continued, he refused a trip to urgent care with a "it's just the flu, there's nothing they'll be able to do."...

Wednesday morning he was up to 104, it was time to go. After discussions with a family doctor friend, he told me he suspected it was this new coronavirus. They didn't have the tests at Urgent Care, so another call to INOVA Fairfax, the best hospital within about 25 minutes of our home to give them a heads up that we were on our way with a suspected case.

They were starting to triage at the ER check in desk just that day. They provided masks when we arrived (they weren't a thing yet, though now my car is riddled with dozens of masks in all shapes, sizes and patterns) His temperature was high, his pulse ox was 91. They took him straight back, away from me, no good byes, no anything.

That evening they discovered pneumonia in both of his lungs. He mustered enough strength to text me with that. He was too short of breath to talk on the phone, asked me to tell his mom to stop trying to call. By the next day he was "upgraded" to the intermediate unit.

The call I'll never forget came around 2pm that day, less than 24 hours from when I'd left him in the ER. "... I'm sorry to tell you this, but we've had to intubate your husband," the doctor said. I broke down again, it's a blurr. He had only been tested that morning, after a Respiratory Pathogens panel taken the night before, yielded all negative results. His kidneys, his liver, the right side of his heart, he was on paralytics, they were proning him. I was desperate by Saturday evening, still no test results from Thursday.

I got a call 12 hours later, late Sunday morning, he was positive. Strangely, a huge sigh of relief came over me....but now what?!?! They asked me to come in to see him. I did, it was horrible. He was paralyzed, and proned. Everyone, including me, were in gowns, goggles, masks and layers of gloves.

By Wednesday, he wasn't getting worse, but he sure wasn't getting any better. ECMO....I knew what this was, my 28 year old cousin had been on at birth for 18 days. I knew it was his only option, I knew it was the final effort to save him. Dr. Osborn called and walked me through it, I consented, of course. Within an hour he was cannulated and his lungs were finally getting a much needed break.

In my notes, I see that March 20, the 3rd day on ECMO was his first sign of improvement. We learned on Day 5 on ECMO (day 10 in a coma) that he had developed pseudomonas (a secondary infection in his lungs) not uncommon. That day was the first of three clamp trials. He did well for a few hours and they did a third one, overnight into his 7th day on ECMO. The amazing Dr. Osborn who had become my favorite Dr. to speak with called to let me know he was decannulated was doing great! Because Titou was only the second in the country to be on ECMO with covid, it was a huge triumph, not just for our family and Titou, but for the team at INOVA. Two days later he was extubated, and 6 days after that, he was home on April 2. It was a whirlwind of a nightmare for us, heart wrenching to relive.

ECMO has been a life saving piece of medical technology/equipment for decades. We are so blessed and grateful to live in an area in the US where this level of care is available to us. The ECMO specialists, nurses and doctors are true angels, with round the clock, specialized care. Without ECMO, our world would look much different. My girls would be without their dad, I'd be a young widow. Today (July) he is 100% recovered. His lungs are clear, no scarring, no residual side effects apart from some slight tingling and tightness in both hands. He is a true miracle, in large part due to ECMO.

Patient: Julian; Shared by parents Amanda & Jess Shores, 2012

I had my son, Julian, on April 6, 2012 at St. Mary's Hospital in Leonardtown, Maryland. I was diagnosed with Cholestasis and Group B Strep, which resulted me in having to deliver my son prior to 38 weeks. My son was born via cesarian, and when he was born he contracted Group B strep and developed Pneumonia and Pulmonary Hypertension of the Lungs. Julian had to be flown by helicopter to Georgetown University Hospital in Washington, DC due to his condition almost immediately after he was born.

The next day, my husband and I were notified that Julian would have to be placed on ECMO and that he had a 5% chance of survival, and it was recommended that I try to get to the hospital in DC to see my son. I chose to voluntarily discharge myself from St. Mary's Hospital and my Father and Mother-in-law drove me to Georgetown University Hospital in the middle of that night. We agreed to place Julian on ECMO that night, and the first attempt was unsuccessful. Thankfully, the second attempt was successful, and Julian was on ECMO for three days before being taken off. During our stay at the NICU, my husband and I tried to stay by his side as much as possible.

We stayed at one of the rooms in the hospital there, and at the Ronald McDonald House in DC. Julian developed a minor brain bleed while on ECMO, and struggled with feeding for about a week or so. It was the most traumatic and terrifying time of our lives. I was able to hold Julian for the first time when he was a week old. Each day, Julian's health improved, as the wonderful doctors and nurses did their jobs to help save our son's life. It was absolutely amazing to see the doctors and nurses doing everything they could to not only save Julian, but to help him thrive and to feel loved.

The little things are what I remember most, like the nurses drawing a picture of Julian as a pirate to decorate his NICU crib, or the Build a Bear stuffed animal that was donated. This made me feel like more of a mother, like my baby would be okay and that there was hope. I was able to successfully breastfeed Julian, and we were able to take him home three and a half weeks later. at Georgetown University Hospital for the next two years.

Taking Julian home was only the beginning of his journey. We had Infants and Toddlers come out to our home twice a week, and we went to appointments at the Development clinic at Georgetown University Hospital for the next two years. Julian graduated from the Developmental Clinic when he was about two. Although it was a strange feeling, this was when we were able to start to let go of all of the appointments, the worries, and just focus on raising our beautiful little miracle of a son. It was the beginning of my healing as a mother, and now Julian is an intelligent, amazing 8 year old boy. He is doing fantastic academically, and loves doing art and learning about animals. Julian is the sweetest person I know, and is the kind of kid who plays outside and will bring me a flower once he is done playing.

We went on to have another child, and Julian is the best big brother. We are more thankful than we could ever express. I try to live each day reflecting that and just loving our family, but we will never forget what Georgetown University Hospital did for our family.

The doctors and nurses not only saved Julian's life, but ours as well.

Patient: Kevin St. Clair; Shared by parents Judy & Scott St. Clair, February 2017

Our son Kevin St. Clair was put on VV ECMO on Friday the 13th, 2017, while in Colombia South America, after having contracted the flu, and having been given a 5% chance of survival without ECMO.

Kevin was airlifted by the US Air Force to San Antonio Military Medical Center where he was put on VA ECMO, and subsequently airlifted to Columbia Presbyterian Hospital in NYC.

Kevin was taken off of ECMO at the end of April, 2017, and was discharged from the hospital on May 21, 2017, his 32nd birthday.

Kevin lives in Denver with his fiance, working as a civil engineer. He did have some lung damage, due to necrosis, during his illness.

Currently skiing in Colorado and climbing 14ers (14,000 foot mountains) is not possible for him. However, Kevin is healthy and happy and leading a full life because of ECMO and amazing, dedicated health care professionals on 2 continents.

ECMO saved Kevin's life.

Patient: David Richards; Shared by himself, 2009

I was one of the early swine flu victims towards the end of 2009, which rapidly progressed to viral pneumonia then severe ARDS. I was treated at my local ICU for three days, where I was put into an induced coma and on a ventilator within hours of admission. Despite being proned, my condition continued to deteriorate and I was transferred to Glenfield Hospital in Leicester, which at the time was the only hospital in the UK providing respiratory ECMO for adults.

I had a tracheostomy performed and suffered a double pneumothorax, and continued to be proned while on ECMO. During my third week on ECMO, I started to lose large volumes of blood from my groin cannulation site which led to me being removed from the circuit. I remained in a coma at Glenfield for a further week before being repatriated to my local ICU.

Two more weeks in ICU followed, then two months on a respiratory ward before I was discharged home. I suffered quite severe de-conditioning and was in outpatient physical rehabilitation for two and a half years at my local hospital. I was clinically diagnosed with PTSD, receiving CBT and EMDR therapy, and referred to neurology for my cognitive issues.

My job was held open for twenty months but when my recovery began to stall, the decision was taken to medically retire me. As a former international track and field athlete, I expected to recover better than most but for whatever reason, it didn't happen but I'll take what I've got and remain grateful for ECMO.

Patient: Kelly (Malloy McLaughlin), shared by herself, 1995

I always am grateful to have the opportunity to share my experience with ECMO because it is a way for me to show my appreciation for all the people who helped save my life.

I was a senior at Michigan State University. My parents had just visited me for my 22nd birthday. After they had dropped me off, I developed fever and chills and felt very weak. The next day I had my roommate drive me to Sparrow Hospital in Lansing. My mom met me there. I was feeling a little better and was eating a sandwich. Then everything in my body started to hurt.

Everything became very bright (I think lots of staff members in my room) and it all went dark. The next thing I knew it was Valentine's Day.

My birthday is December 3rd. I had developed a strep pneumonia and became septic. I had ARDS. I had DIC and multi organ failure. My skin deteriorated over 60% of my body so I needed skin grafts.

I was flown to the U of M by Survival Flight and Dr. Bartlett had the tough conversation with my parents saying that he could try ECMO. I believe I was on ECMO for about 14 days. I have been told I was taken off and then had to be put back on (which they weren't sure would work). I had a tracheostomy and g-tube.

After two and a half months in the SICU I weaned off the vent and went to a progressive stepdown unit, then rehab. My goal was to be home by St. Patrick's Day. I think I was close.

I had physical and occupational therapy for the summer and returned to MSU in the fall. I did have to wear burn garments for two years which was a big time annoyance but did it. The immense health care team saved my life.

Since then I have graduated, gotten a Masters of Social Work. I work at Beaumont Hospital in Royal Oak, Michigan. I currently cover high risk obstetrics but have been in all different areas including the SICU where they are now doing ECMO. I have a healthy, happy nine year old daughter named Shea. I have had, and have, a good life.

I always get asked what I remember. Very little after it all went dark. I remember being thirsty and wanting sprite all the time. I remember people talking about ordering food and I could not have any. Coming off vent was not the most fun. Sort of felt like I could not breath at times. I had a lot of crazy vivid dreams. That is about it.

Support from my friends and family saved my life.

Dr. Bartlett saved my life.

ECMO saved my life.

THANK YOU!!!

Industry Partners

First, A Word of Thanks to Our Industry Partners

ELSO's industry partners have historically played an important role. This year, they were instrumental in supporting ELSO's virtual meeting. We acknowledge and appreciate their shared commitment to sharing knowledge, especially during the pandemic. So many of our ELSO family were extraordinarily impacted by the pandemic and this new model was going to be very different. And yet, when asked for help, they met the challenge with us. We are grateful for their partnership. In addition, industry partners have been stretched during this pandemic as well. We appreciate their ability to help solve equipment problems as best as they could with us during a time of crisis.

Technology & Innovation and Device Development Group

ELSO's Technology Committee launched the Device Development Group (DDG) in 2018 to bring a group of industry, regulatory, and clinical practitioners together for the benefit of patients. ELSO represents those patients, and for that reason proposes to establish a venue and a format to foster that dialog and cooperation. This group has continued to engage in data improvements, reporting improvements and other efforts for improved understanding of performance that may impact patient outcomes.

Regulatory Agency Partnerships

ELSO's Technology Committee, DDG, and Registry Committee continues to work closely with the FDA and others regulatory agencies on data quality and reporting to help better understand device performance and innovation opportunities in the context of clinical performance.

Improving Data Quality

ELSO is committed to working with our partners to continue to improve performance. Data is the foundation of knowledge and we look forward to our continued partnerships with industry and others in this arena.

The ELSO Team







Top Row: Kennethia Banks, Operations Manager; Elaine Cooley, Clinical Program Manager; Elizabeth Moore, Education Diretor; Peter Rycus, Executive Director; Christine Stead, CEO

Bottom Row: Phil Boonstra, Biostatistician; Alex Fox, Project Manager

A Message from the CEO

2020 threw challenges our way. As a global community, it continues to be inspiring to meet this challenge - together. During this pandemic, we asked our member centers to change the way you submitted data to the ELSO Registry regarding COVID-19 patients. You did, and you continue to. You took the extra time to share what you were learning in real-time and take more dedicated time to share evidence-based findings. This continues to be evident in the many means with which you are all working together to help each other do better, and our global ECMO patients do better. The scientific papers, webinars, real-time correspondence across a variety of platforms, and the responsiveness to colleagues' calls for help.

As we look ahead into 2021, our needs to work together as a global community will only grow. Research collaborations born out of the pandemic will continue to be needed and valuable. Improvements in communication, collaboration, and cameradarie will help us impact knowledge, training, equipment availability, advocacy for adequate resources and support, and the growing global community that is ELSO.

We are grateful for the community that we have, inspired by the commitment to do better, and ready to meet the challenges of tomorrow with you. We look forward to what we will do together, the impact that is possible with a global team, and the continued improvements in patient care and outcomes that we can bring to fruition through knowledge, training, and working together.

Thank you for the opportunity. We are with you, whatever your ECMO and ECLS needs may be. Help us shape the future together.

Christine Stead, MHSA
CEO, ELSO

Christine Stead, CEO

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