

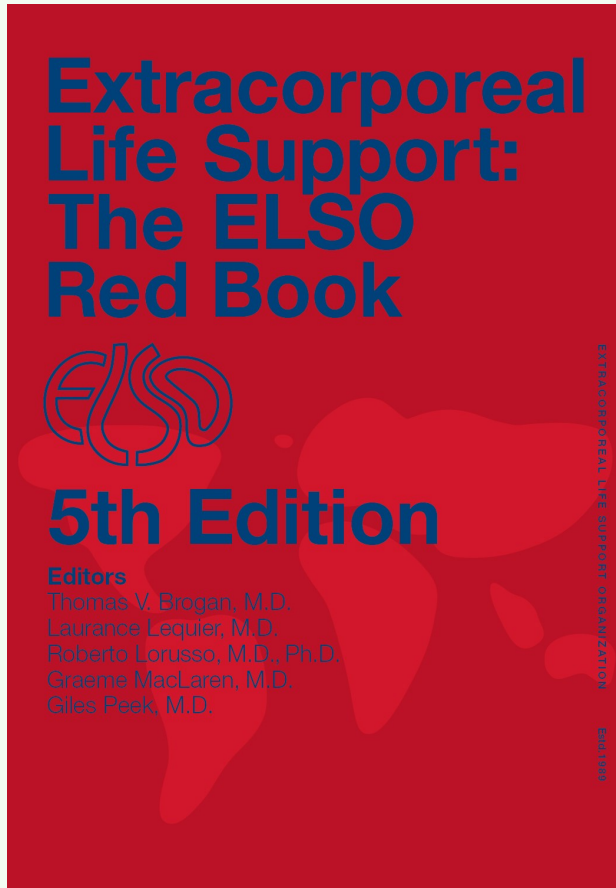


# THE FLOW

March 2017

“Plan your day, but live for the interruptions.  
They often turn out to be the part that matters most.”

-J. Devn Cornish, MD



*The release date for 5<sup>th</sup> Edition of the Red Book is scheduled for late Spring of 2017!!*

Join us at our 28<sup>th</sup> ELSO Annual Congress Sept 24-27<sup>th</sup> at the Hilton Hotel in Baltimore, Maryland. Our pre-conference will provide 2 tracks: one for new providers and programs that will give didactic and simulation exercises on many topics—how to make a cannulation cart, what equipment to order, general physiology, and patient management. The other track will focus on more advanced ECMO care—expanding on last year’s cardiogenic shock populations and updating on newer methods of combined techniques for respiratory and organ support. Hands-on application of other tools such as the Impella, Tandem Heart, artificial lung will also be provided. Management of difficult cases with “realistic” simulations will be provided.

Our main conference will feature Peter Provonost talking to us about using quality measures to improve care and outcomes, Alan Flake telling us what’s new with the artificial placenta; lessons learned during a 605 day ECMO run—ethics, economics, physiology and outcomes; and breakout sessions for clinicians and staff caring for everyone from neonates through adults. Spotlight research sessions during breaks and lunch will also occur.

Visit the [ELSO website](#) for more details.

## *The ELSO Award for Excellence in Life Support*

If you last received an award in 2014, you need to submit an application to be considered for the 2017 award.

**Application deadline April 1, 2017**



## *Nominations for Fellowship of the Extracorporeal Life Support Organization (FELSO) Now Open!*

*The ELSO community can now make nominations for induction to FELSO, the honorary designation recognizing extraordinary contributions to the art and science of ECLS. Applications will receive consideration by the FELSO Nominating Committee. Please see the link below for more information and online application.*

<http://www.else.org/FELSO.aspx>

*Happy  
Spring!*



Maryland  
Baltimore  
Land of pleasant living  
Charm City  
Emore Loving



***ELSO's 2017 Annual meeting in Baltimore will soon be open for registration!***

September 25-27, 2017 with Pre-Conference September 24-25 at the Baltimore Hilton.

***There will also be many new options for vendor opportunities this year!***

## ***ELSO Adult ECMO Training Course***

Drexel University College of Medicine  
Philadelphia, PA

Date: ***Tentatively*** June 21-24, 2017

Location: Medical Simulation Center & Technology in Medical Education (TIME), Philadelphia, PA

ELSO 734-998-6600

[ECMOTraining@else.org](mailto:ECMOTraining@else.org)

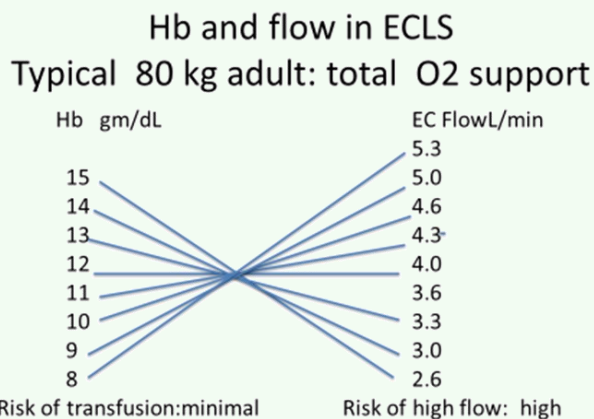
# Bedside with Dr. Bartlett

*Dr. Bartlett is considered by many to be the "father" of ECMO. He has a vast amount of experience and has faced many critical situations and decisions. In this newsletter series, he will join us on ECMO rounds at the bedside.*

A 35 year old 80kg man with influenza, pneumonia, and ARDS has been on VV support for four days. Today he progressed to total white out with no lung function. His hematocrit is 27 and the ECMO flow is 5 L/min and he is becoming more hypoxic. His venous saturation is 50% and his arterial saturation is 80% and gradually falling.

## ***What's happening and what should we do?***

His oxygen requirement at rest is 240 cc/min (3cc/kg/min). Because he is septic, his metabolic rate is 4cc/kg/min (320 cc/min). While he still had some lung function, his oxygen was being supplied by the EMCO circuit and by his native lung. Now that his native lung has stopped supplying O<sub>2</sub> altogether, all of the oxygen for metabolism is supplied by the ECMO circuit. With a hemoglobin concentration of 9 gr/dL and a venous saturation of 50%, we are supplying 6 cc of oxygen for each deciliter of flow. At 50 deciliters per minute, this is 300 cc of oxygen which is not enough to match his oxygen requirement of 320 cc/min. He is gradually falling behind, compensated to some extent by higher oxygen extraction, indicated by decreasing venous saturation. In his right atrium, the fully saturated blood from the ECMO circuit is mixing with some of the native venous return which is 50% saturated. The resultant saturation is 80% (indicating that his total cardiac output is approximately 8 L/min). So what we need to do is to increase the amount of oxygen we are giving him through the ECMO circuit to at least 320 cc/min, or better yet over 400 cc/min to provide some reserve. We have two choices to do that: we could add another venous drainage cannula and increase the flow to 8 L/min which would delivery 360 cc of oxygen; however, it is always better to provide full support at the lowest flow possible. If we increase his hemoglobin concentration to 12 with the same venous saturation, his blood flow can be decreased to 4.5 L/min which will deliver 360 cc of oxygen. If we increase his hemoglobin to 14, we will deliver 9.4 cc of oxygen per deciliter of flow so we can reduce the flow to 4 L/min yielding 376 cc of oxygen per minute. The relationship between flow and hemoglobin to deliver 240 cc/min is diagramed in this figure.



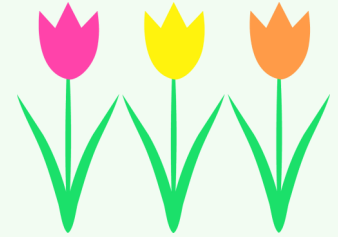
This represents the relationship between hemoglobin and flow to deliver 240 cc/min of oxygen, assuming a venous saturation of 70%. This relationship can be calculated for any size patient and should be considered whenever there is a tradeoff between flow and hemoglobin.



# Website Corner

## Spring into your favorite topic on the Discussion Board!

Spring is nearly here, and the Discussion Board is in full bloom! More and more members are participating. The only thing missing is you!



## Discussion Board Topics of the Month

These are the hottest topics. Stop by and provide your input!

[DLVV Cannulation](#): Who has privileges in your hospital to place dual lumen cannula for VV ECMO?

[Priming CardioHelp ¼" Circuits](#): What do centers do for priming ¼" versions of the CardioHelp circuit for their neonates?

[ECLS Specialist Primer/Initiation/Trouble Shooting](#): What are centers using for these roles?

## Discussion Board Contributor of the Month

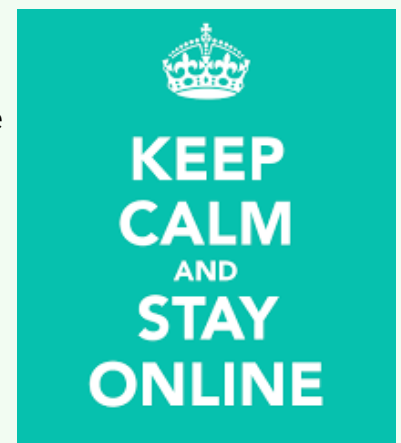
Congratulations to Jessica Sturgill, RRT from Spectrum Health Hospitals in Michigan. Thanks for your great questions and keep those posts coming!

## Logging On

All ELSO Member institutions have an Administrative Account for your ELSO Registry data entry. This account can create separate accounts for your local physicians and ECMO Specialists. Contact your local ECMO Coordinator to get your accounts set up!

## Keep it Online!

As a reminder, we urge our users to avoid offline conversations. The Discussion Board is meant to be an open forum for everyone to discuss the latest and greatest in ECMO and how they are tackling the problems that we face everyday. Please do try to avoid requesting responders to contact you offline or providing phone numbers and individual e-mail addresses. We will edit your posts to remove this information in an effort to try and keep conversations online.



# The ELSO Award of Excellence – Opportunity for Improvement



## How does my Center achieve Platinum?

ECMO Centers often inquire: How do you achieve Platinum? The Award levels were introduced in 2015. This was implemented by request of the ELSO Steering Committee to recognize the highest scoring Centers. There have been 5 Platinum Level Centers to date.

## How are Applications Scored?

Every Award application is scored using a tool that has been validated and tested for inter rater reliability. Each center's application is scored and those points determine what level is achieved. Each section of the application has a maximum number of points that can be achieved. Each question, barring those that are pre-determined to be just Does Not Meet or Meets, are scored as Does Not Meet = 0, Somewhat Meets = 10, Meets = 20, Somewhat Exceeds = 30 and Exceeds = 40.

In order to reach the Gold or Platinum level you must achieve the pre-determined score for each category. If you review your scores you will see in which category you achieved well or didn't achieve well – and how those scores relate to other centers, as well as how they relate to the score required to achieve platinum.

The Award Committee recommends using the Readiness Tool – it has many helpful questions that may spur you to think about new projects and adding more depth when answering questions.

## A Note about Continuous Improvement

Remember that the Award process should be continuous and on-going. Each Center should have a plan in place that is reviewed and updated every three years. Centers that do not continuously update and improve their practices will find themselves scoring lower in the scoring tool.

## What about Site Visits?

Additionally, ECMO Centers should maintain a “Center of Excellence Notebook” where documentation of projects and processes are kept for reference. Beginning in 2017, a percentage of each year’s applications will be subject to a Site Visit for validation of their Application. This notebook will facilitate that visit.

**Inquiries?** Email: [award@elso.org](mailto:award@elso.org)

# Registry Riddles



We continue to update the Registry Data Definitions and are answering questions as they occur. If you have a question, please email Peter Rycus [prycus@elso.org](mailto:prycus@elso.org).

*NEW!!* The instructions for how to maneuver within the Registry website are now available as a support document at [elso.org](http://elso.org)

**Q:** Do I have to enter a patient that was on a VAD with an Oxygenator cut in-line?

**A:** Yes! A patient on a VAD, such as a centrifugal pump, with an oxygenator in-line is the definition of ECMO. These patients should be registered.

**Q:** How do I identify a patient that was transitioned to another extracorporeal device?

**A:** The indications for discontinuing ECMO will soon be updated with this as an option. Stay tuned!

**Q:** We had a patient that was on ECMO, went to the OR for CABG while on ECMO. He was weaned off ECMO and BiVADs were placed. After a short period of time, while still in the OR, an oxygenator was needed and was cut in-line into the RVAD. How do I register this?

**A:** Because the patient was transitioned for such a short period of time and never left the OR, this would be considered one run. Adding a new Run Detail will capture the new equipment. Second runs should be considered when the patient is off ECMO for a prolonged period of time and decannulated.

# ELSO MEMBERSHIPS



Become a  
**MEMBER**  
Click here

## ELSO Membership

- ECMO clinicians, research scientists, and members of regulatory and public health institutions are now eligible for membership in ELSO
- Membership allows physicians, nurses, perfusionists, respiratory therapists, researchers and other healthcare professionals to become more directly involved in the world's largest ECMO community
- Affiliation with an ELSO Member Center is not necessary to apply
- Members receive benefits separate from Member Center privileges

## Benefits of membership include:

- Direct participation in the world's largest ECMO community
- ELSO Member Newsletters
- ELSO Registry Data Reports– January 2017 Reports available on website!
- Discounts on one copy of the ELSO Red Book (\$20 off list price) and one copy of the ECMO Specialist Manual (\$5 off)
- 10% discount on Annual ELSO Conference Registration fee
- Official Certificate of ELSO Membership
- Admission to the Members-Only Business Meeting at the Annual ELSO Conference
- Discounted registration rates for global ELSO Chapter Conferences (EuroELSO, Asia-Pacific ELSO, Latin-America ELSO, South & West Asia ELSO)
- Access to the ELSO Online Discussion Board
- Access to ELSO Online ECMO Knowledge Assessment Examination (Certificate of Completion included upon successful completion)
- Eligibility to participate in ELSO Committees and Working groups

Please visit us at <http://www.else.org/members/individualMembership.aspx>

*Please note that for the 10% discount on the Annual North American ELSO conference it can take up to 2 weeks to import your discount code into the CVENT registration program.*

# *Anticoagulation in ECMO patients: Searching for a gold standard*

*Nandini Nair MD, PhD , Enrique Gongora MD*

Adult ECMO gained momentum since the first randomized clinical trial showing a positive outcome in adults with respiratory failure (1) as well as numerous reports of success in H1N1 influenza patients (2). It is now considered a viable therapy even in pregnancy (3). With increased utilization of ECMO in adults in current day practice, some of the most common complications such as bleeding and coagulopathy need further review and analysis. Interaction of blood with non-endothelial surfaces, results in inflammatory and pro thrombotic effects. Initiation of ECMO leads to consumptive coagulopathy as well as a dilution of coagulation factors resulting in decreased fibrinogen levels. The inflammatory response generated by ECMO gives rise to a hypercoagulable state, requiring anticoagulation to prevent thrombus formation throughout the circuit. The delicate balance between adequate anticoagulation and bleeding complications presents one of the greatest challenges of ECMO therapy today. A wide range of anticoagulation protocols are used across the different centers. Uniformity in these protocols is lacking (4).

Several aspects of current anticoagulation practices require further investigation. The degree and the type of anticoagulation as well as utility of newer anticoagulants besides heparin all require careful consideration in the optimal management of adult ECMO patients. Additionally, it is not clear what the optimal method is for monitoring efficacy of anticoagulation. This will also vary with the type of anticoagulant used. Currently with heparin as the standard anticoagulant ACT, PTT and Factor Xa are

all used in addition to technologies such as the thromboelastography and thromboelastometry. Less aggressive anticoagulation protocols tend towards lower bleeding complications and possibly better survival . Further studies are needed in this area.

Historically ECMO was the mainstay of rescue in pediatric care. The techniques practiced in adult ECMO today have hence evolved from pediatrics. Larger cannula size and higher flow in adult ECMO impact turbulence, stasis and thrombogenicity. Simple circuits with minimum number of connectors create less turbulence while larger cannulas especially on the venous side reduce stasis and thrombogenicity, therefore requiring lower levels of anticoagulation. This suggests that anticoagulation protocols used in the pediatric population may not be ideal in adults.

Survival on ECMO appears to be more favorable in the younger population and bleeding /coagulopathy appear to be the most common complications which raise the possibility if the coagulation system changes in its character and dimensions with advancing age. Interestingly, aging is accompanied by increases in plasma concentrations of factors VII, VIII, and fibrinogen progressively (5, 6). Up regulation of the coagulation cascade with age may accelerate thrombosis in pathological states demanding special attention when designing anticoagulation therapy for elderly patients on ECMO.

Variations in genetic polymorphisms and

*(Continued on page 9)*



ethnicity further influence drug metabolism and efficacy which need to be accounted for while developing anticoagulation protocols and selecting anticoagulants (7). Clinical significance and predictive value of hypercoagulability markers need to be defined in different age groups in prospective studies in order to be able to define optimal anticoagulation regimens. Research is needed in areas of optimizing anticoagulation protocols in adults with respect to age, gender, race, ethnicity and technical aspects. If tailored appropriately adult ECMO therapy could probably achieve better success with far less aggressive anticoagulation than that used in the pediatric population.

### References

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[CLICK HERE TO TAKE SURVEY](#)

Although over 26,000 newborns have been treated with ECMO since 1975 and survival rates have improved, intracranial injuries remain a major complication. Despite a high frequency of abnormalities identified on neuroimaging, there appears to be little standardization of neuromonitoring protocols during or after treatment (Van Heijst 2014).

In light of these facts, we are surveying all ELSO pediatric programs to determine the landscape of clinical practice utilizing neurological testing in this patient population. The following anonymous survey will take **no more than 5 minutes to complete** and we greatly appreciate your participation in this research project.

This survey has been approved by our institution's IRB and does not include identifiers for your institution. The survey should be compatible with your mobile phone as well.

For further info, please contact the primary investigator of this study:

Jennifer Bain, MD PhD,  
Assistant Professor Child Neurology  
01(646) 426-3876  
Neurological Institute of New York  
180 Fort Washington Ave , Mail Code: 5th FL  
New York, NY 10032 USA



# Upcoming Courses and Meetings

## **LAELSO Adult VV ECMO Course**

4/5/2017 - 4/8/2017

<http://www.anestesiologia.cl/ecmolatam/contacto.php>

Location: Hotel Radisson La Dehesa, Santiago Chile

E.U Andrea Fernández +56 226105251 [andreacl@gmail.com](mailto:andreacl@gmail.com)

## **ELSO Adult ECMO Training Course**

4/5/2017 - 4/8/2017

Location: Emory Conference Center, Atlanta GA

**Peter Rycus**, MPH 734-998-6600 [prycus@elso.org](mailto:prycus@elso.org)

**Course is full.** Go to [ELSO Website](#) for waitlist details

## **Euro-ELSO 2017**

5/4/2017 - 5/7/2017

<http://www.euroelso.net/euroelso-2017.html>

Location: Maastricht, The Netherlands

## **27th Annual Specialist Education in Extracorporeal Membrane Oxygenation (SEECMO) Conference**

6/2/2017 - 6/4/2017

Location: Children's Hospital Colorado - Aurora, CO

**Alexandria Wilkinson** 720-777-6948 [alexandria.wilkinson@childrenscolorado.org](mailto:alexandria.wilkinson@childrenscolorado.org)

## **INOVA ECMO Symposium**

6/2/2017 - 6/3/2017

Location: Falls Church, VA

**Elizabeth Cossa Gallagher** at [Elizabeth.cossagallagher@inova.org](mailto:Elizabeth.cossagallagher@inova.org) or **Heidi Dalton** at [Heidi.dalton26@gmail.com](mailto:Heidi.dalton26@gmail.com)

## **28th Annual ELSO Conference**

9/24/2017 - 9/27/2017

Location: Baltimore, MD

**Peter Rycus**, MPH 734-998-6601 [prycus@elso.org](mailto:prycus@elso.org)

28th Annual ELSO Conference September 25-27, Pre-Conference Symposium September 24-25.

Venue: Hilton Baltimore

## **Asia-Pacific ELSO Conference 2017**

10/12/2017 - 10/17/2017

Location: Gold Coast, Queensland, Australia

<http://apelso.com/>

## Facebook

If you use Facebook please visit our sites and “like” us! We intend to use Facebook as a way to present information to not only ELSO members but to anyone who is interested in our organization. [www.facebook.com/ELSO.org](http://www.facebook.com/ELSO.org)



Euro-ELSO Facebook page:

[www.facebook.com/EuroELSO](http://www.facebook.com/EuroELSO)



## Twitter

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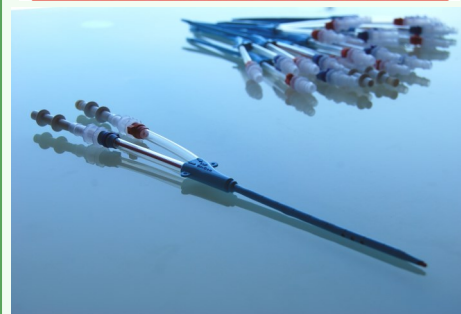
"Having solved the problem making the RDLC tips, the process of molding the hub onto that tip has just fallen apart. Scrap rates of 90% have caused us to abandon that mold and build a new one of a different design. This process is likely to take 14 weeks until the first prototypes can be run, but I will keep the community updated.

I sincerely apologize for the delays, and would like to reassure all of the ECMO community that we know how important this product is and are doing everything we can to get production re-started.

Richard Martin  
OriGen

# OriGen

BIOMEDICAL



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The ELSO Newsletter editorial team’s goal is to bring you a newsletter that is entertaining, informational, and educational. We are always looking for additional members to join our team. If you would like to join us or have any suggestions for improving the newsletter or would like to contribute content, please contact Joel Davis at [jdavis@elso.org](mailto:jdavis@elso.org).

Thank you from the ELSO Newsletter editorial team  
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Omar Al-Ibrahim, Terri Wells, Nandini Nair

