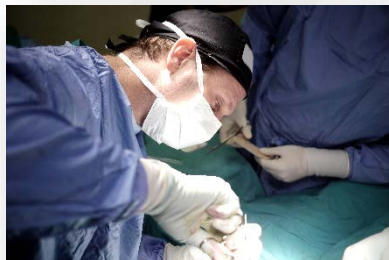


ArborMetrix



ELSO Quality Reporting Platform Training
August 7, 2018



AGENDA

- About the Webinar
- User Access and Logins
- Reports
- Data Overview
- Q&A – Submit your questions!
 - Via chat: You may submit questions to ‘Everyone’ – publicly viewable in chat window – or directly to Ryan Barbaro
 - Via email: ELSOSupport@arbormetrix.com
 - Tech help? Send a message to ‘Webinar Support’ in ZOOM chat



WEBINAR MODERATORS

- Katie Trapp – ArborMetrix Program Manager
- Webinar Support
- Ryan Barbaro, MD – ELSO Registry Committee
- Peter Rycus – ELSO Program Director





USER ACCESS AND LOGINS

LOGIN

A new account has been created for you in the ELSO Quality Reporting Platform. The portal is accessible at:

<https://elso.arbormetrix.com>

Please click the link below to activate your account. This link will remain active for 48 hours. If the link is expired, please reply to this message to generate a support request.

[Account Activation](#)

We look forward to your participation.

The information contained in this transmission is proprietary to Extracorporeal Life Support Organization and is intended for use only by the individual or entity to which it is addressed, and may contain information that is privileged, confidential or exempt from disclosure under applicable law. If you are not the intended recipient or it appears that this mail has been forwarded to you without proper authority, you are notified that any review, distribution, or duplication of this communication in any manner is strictly prohibited. In such cases, please contact the administrator or info@arbormetrix.com by reply email and delete this mail from your records.

You have successfully activated your account in the ELSO Quality Reporting Platform. The portal is accessible at:

<https://elso.arbormetrix.com>

We look forward to your participation.

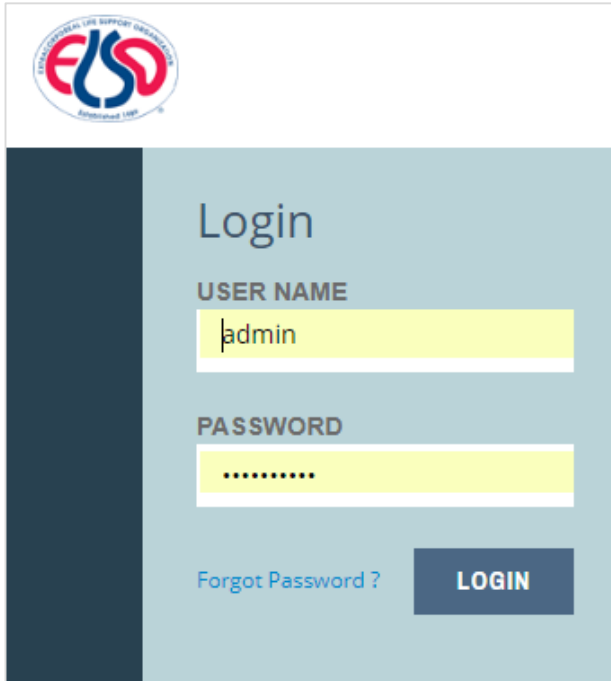
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INSTRUCTIONS

- User ID activation emails will be sent on Monday, August 6th
- One unique user ID per email address
- Password must contain at least 8 characters, at least one capital letter and number – ex., ‘Start123’ not ‘password’
- Each organization’s administrator can create new IDs and delegate access for others in the organization
- To request additional logins:
ELSOsupport@arbormetrix.com



LOGIN



ELSO
EMERGENCY LIFE SUPPORT ORGANIZATION
ESTABLISHED 1988

Login

USER NAME
admin

PASSWORD

[Forgot Password ?](#) **LOGIN**

INSTRUCTIONS

- Access the ELSO quality reporting platform at **also.arbormetrix.com**
- Supported browsers: Chrome, IE11 and Firefox



USER MANAGEMENT

The screenshot displays a web application interface for user management. A dark blue sidebar on the left contains icons for a user profile, a clipboard, a bar chart, and a question mark. The main content area has a light blue header with a navigation menu containing 'User List' (highlighted with a red box) and 'Center List'. Below the header, the 'User Information' section contains form fields for 'User Name*' (ktrapp), 'First Name*' (Katie), 'Last Name*' (Test), and 'Email*' (test@arbormetrix.com). The 'Work Phone' field contains '734-773-7999' and 'ext.' followed by a small white box. The 'Cell Phone' field is empty. The 'Preferred Contact Method' dropdown is set to 'Work Phone'. The 'Status' dropdown is set to 'Enabled'. The 'Functionality' section includes three columns of permissions: 'Data Management' (Preview pages in application, Export Data, View), 'Reports' (Center Level), and 'Administrative' (Provider Manager, User Manager).

User Information			
User Name*	First Name*	Last Name*	Email*
ktrapp	Katie	Test	test@arbormetrix.com
Work Phone	Cell Phone	Preferred Contact Method	Status
734-773-7999 ext. <input type="text"/>	<input type="text"/>	Work Phone	Enabled

Functionality		
Data Management	Reports	Administrative
<input type="checkbox"/> Preview pages in application	<input checked="" type="checkbox"/> Center Level	<input type="checkbox"/> Provider Manager
<input checked="" type="checkbox"/> Export Data		<input checked="" type="checkbox"/> User Manager
<input checked="" type="checkbox"/> View		

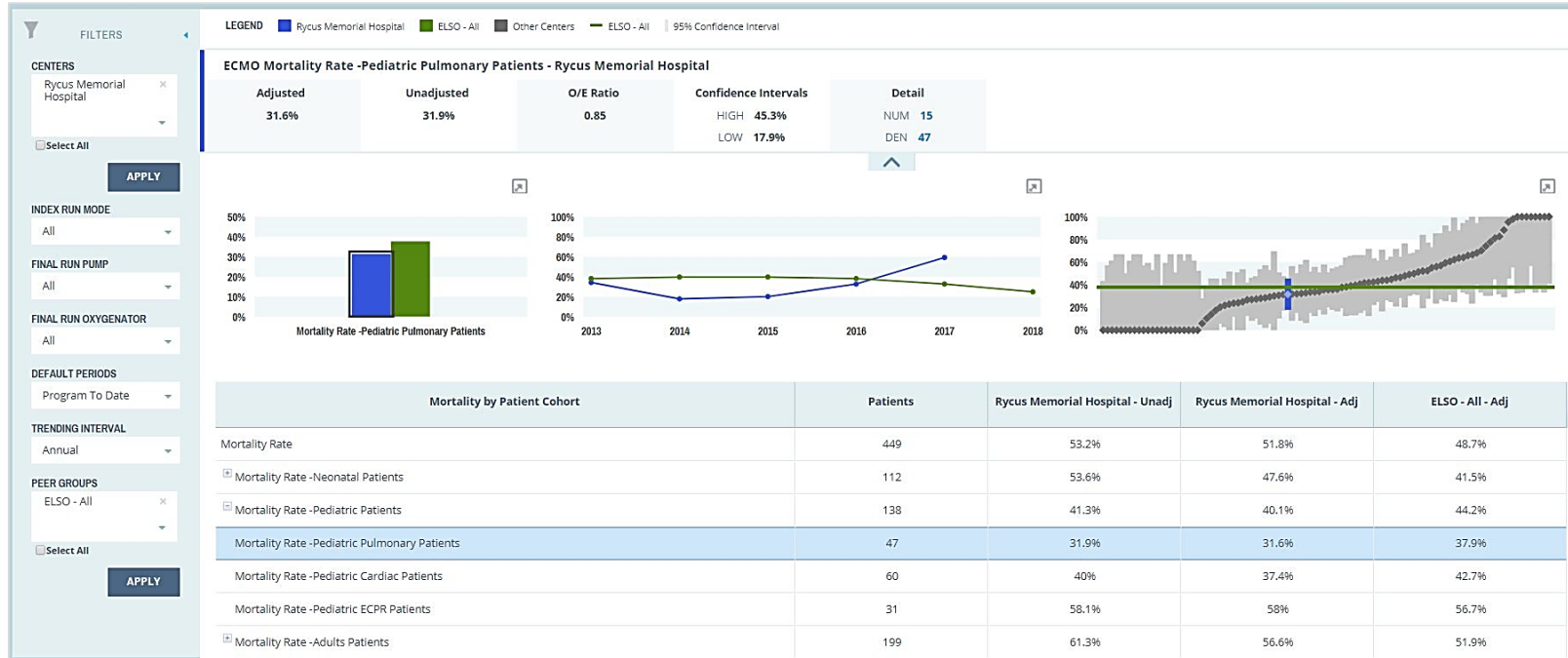
- Go to User List and click the '+' sign to create a new user
- Check the selected permissions and click 'Save' to send a user activation email
 - The above checked permissions will create another user administrator
 - Remove the 'User Manager' permission for reporting-only users
- Click the 'key' icon to send a password reset link





REPORTS





REPORT FEATURES



- Data is displayed in bar chart, scatter plot and caterpillar plot formats. Each element can be drilled down into detail.
- Anonymous ELSO benchmark data is displayed in green



REPORTING DRAWER

LEGEND				
 Rycus Memorial Hospital	 ELSO - All	 Other Centers	 ELSO - All	 95% Confidence Interval

ECMO Mortality Rate -Pediatric Pulmonary Patients - Rycus Memorial Hospital				
Adjusted	Unadjusted	O/E Ratio	Confidence Intervals	Detail
31.6%	31.9%	0.85	HIGH 45.3%	NUM 15
			LOW 17.9%	DEN 47

- **Adjusted Rate:** Individual case O/E multiplied by population expected value.
Adjusted Rate = O/E x Overall Expected Rate
- **Unadjusted Rate:** Based on raw data, the unadjusted rate is the percent occurrence of the event being measured. *Unadjusted Rate = Numerator/Denominator*
- **O/E Ratio:** O/E greater than 1 means more events observed than expected, and O/E less than 1 means fewer events observed than expected.
- **Confidence Interval:** There is a 95% probability that the calculated value of the event being measured will fall within this range.



USING FILTERS

FILTERS

CENTERS

Rycus Memorial Hospital

Select All

APPLY

INDEX RUN MODE

All

DEFAULT PERIODS

Program To Date

TRENDING INTERVAL

Annual

Annual

Semiyar

Quarterly

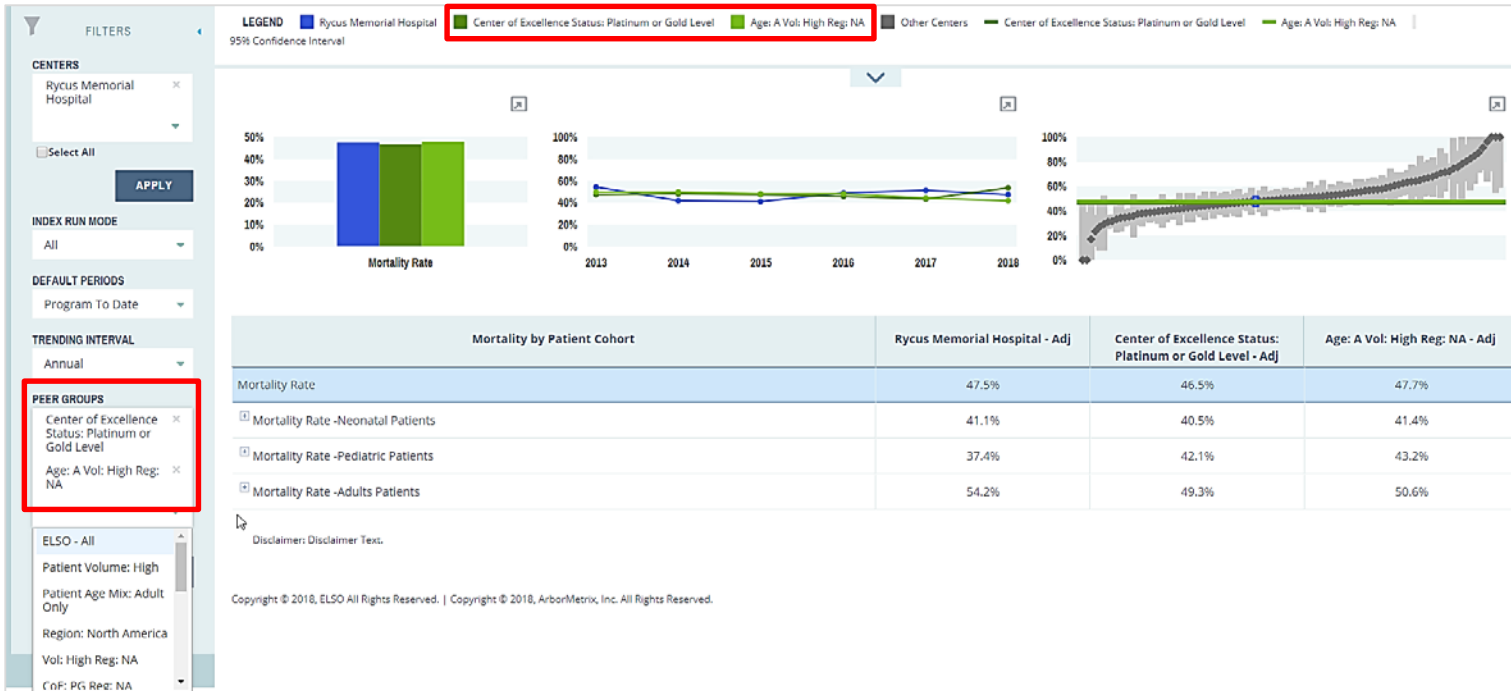
Monthly

Select All

APPLY

- Selecting a new filter and clicking 'Apply' will cause the chart data to re-load based on the new criteria

PEER GROUPS



- Benchmark against all ELSO or specific peer groups
- Multiple peer groups can be selected and will be broken out in the legend for all chart types
- You will only be able to select a peer comparison if you are a member of that group and if the group has 10 or more centers.

PEER GROUP ABBREVIATIONS

- **Patient Age** (A, P or M)
 - A = Adult Only, P=Pediatric Only, M=Mixed
- **Region** (Reg)
 - AP = Asia-Pacific, EU = Euro, LA = Latin America, NA = North America, SWAC = Southwest Asia/Africa
- **Volume** (Vol)*
 - High (45+), Med (17-44), Low (1-16)
 - **Annual case volume calculated once yearly as a 2-yr rolling average*
- **Center of Excellence** (CoE)
 - PG = Platinum or Gold, S = Silver, Not CoE



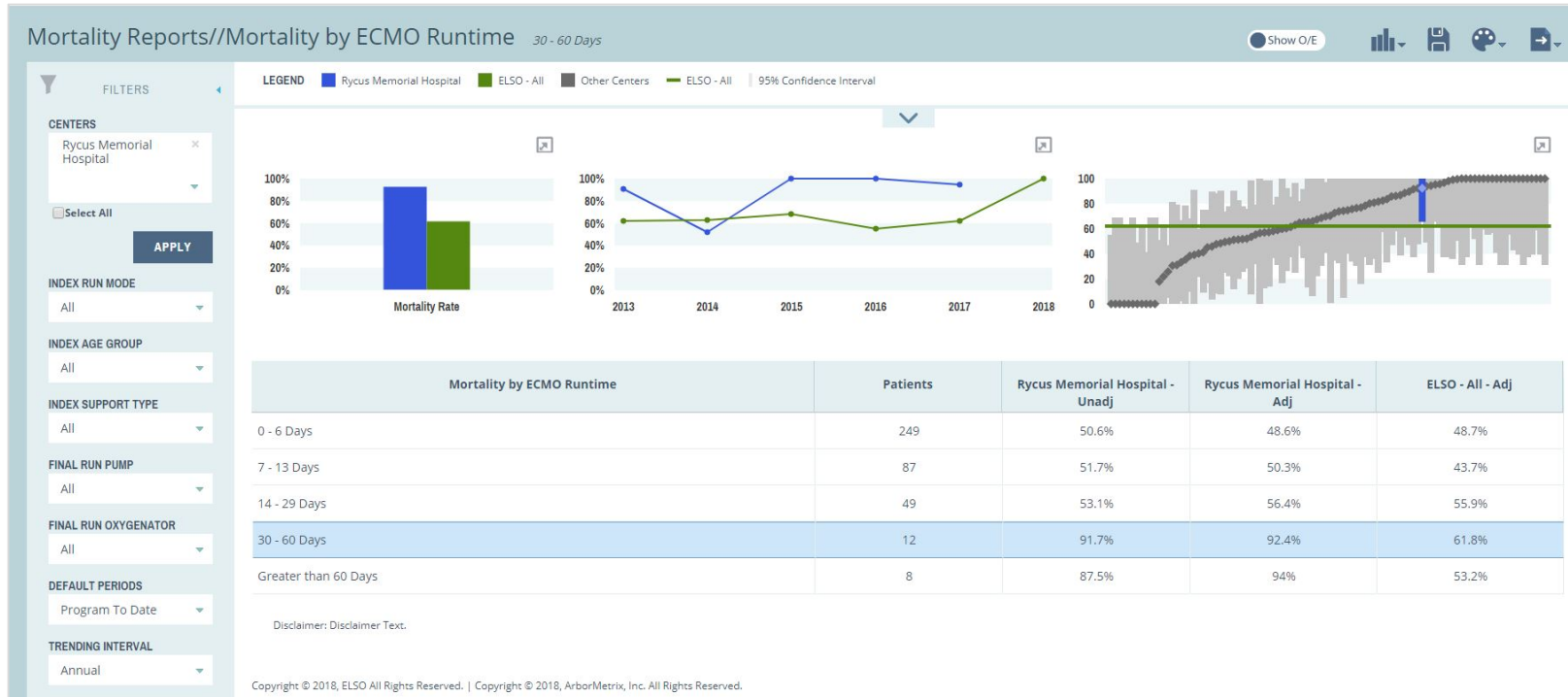
REPORTS MAIN MENU



Dashboards	Mortality Reports	Complication Reports	Pivot Tables
Patient Level Dashboard	Mortality by Patient Cohort	Complication Detail	Patient Level Pivot Table
Run Level Dashboard	Mortality Rates by ECMO Runtime	Complications per 1000 Run Hours	Run Level Pivot Table
		Time to First Complication	
		Mechanical Failure Trends	
		Complication Trends	
Device Reports			
Mortality by Oxegenator			
Mortality by Blood Pump			
Complications by Oxygenator			
Complications by Pump			

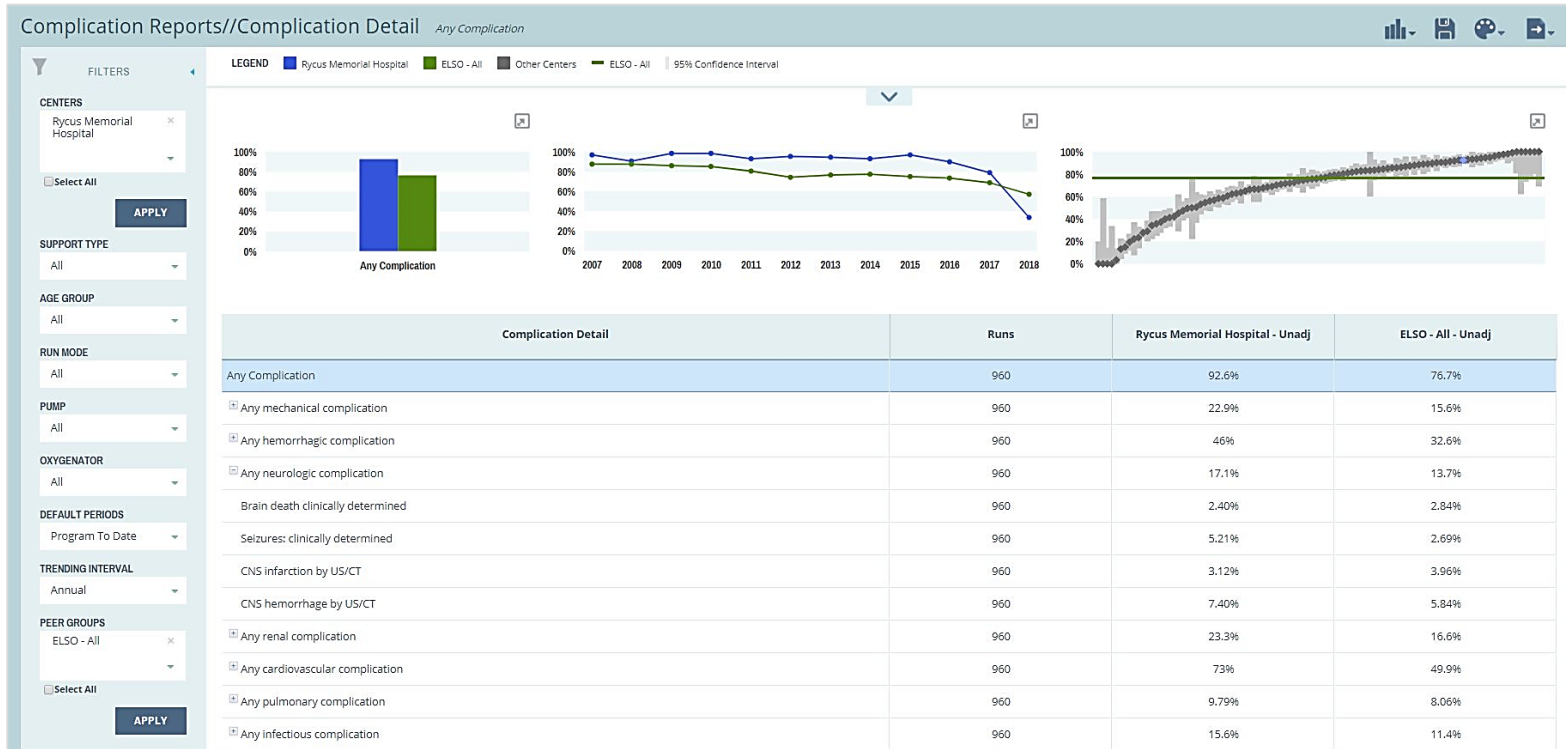
- The reports main menu can be accessed from the left hand navigation
- View a list of all available reports

MORTALITY RATES BY ECMO RUNTIME



- How patients survive on ECMO for different periods of time

COMPLICATION DETAIL



- Various different ways of looking at complications

COMPLICATION TRENDS



- Ability to look at complications over time broken down by major, minor, patient and mechanical

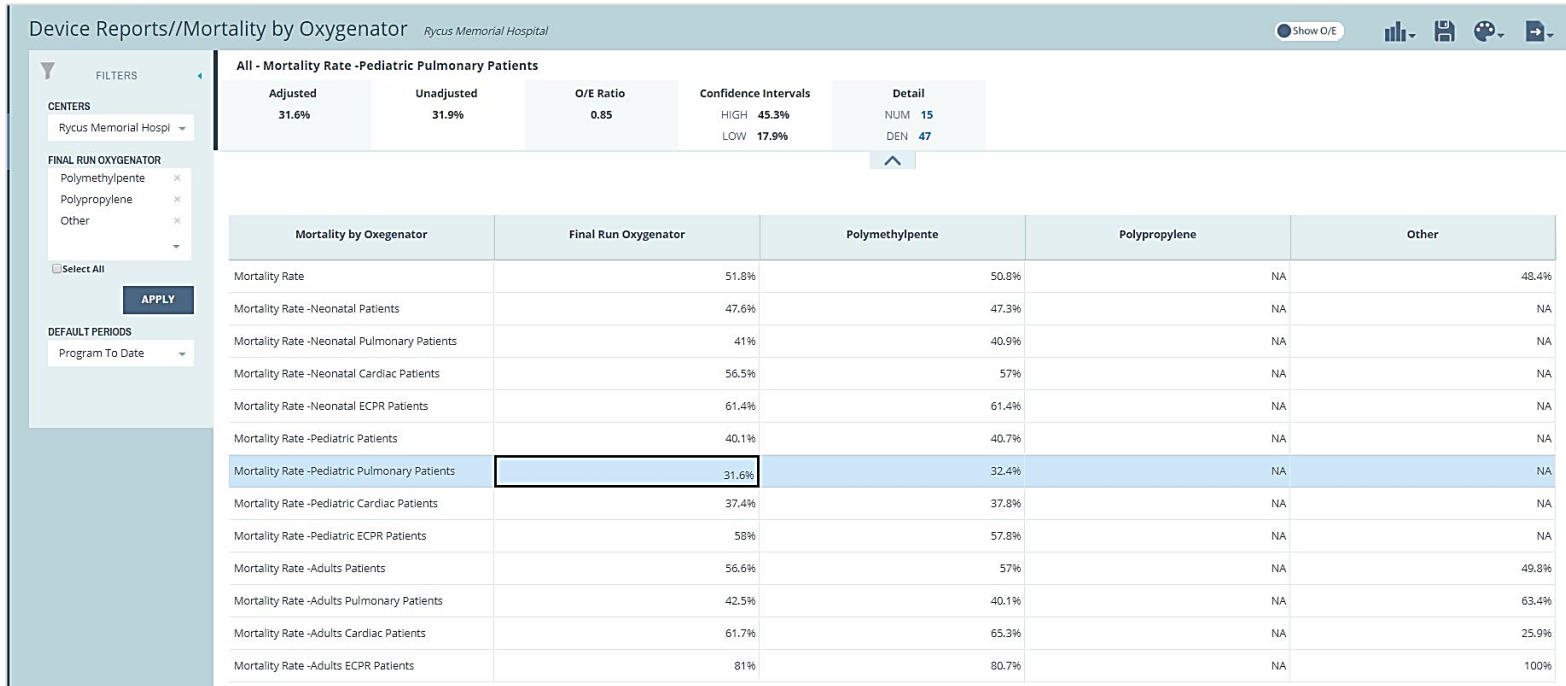


COMPLICATION CLASSIFICATIONS

- **Major Complication** = Brain Death, CNS Infarction, Intraventricular CNS hemorrhage, CPR Required, Tamponade (blood), Pulmonary Hemorrhage, Fasciotomy, Amputation
- **Minor Complication** = Any complication not classified as minor
- **Mechanical Complication** = Oxygenator failure, Raceway rupture, Other tubing rupture, Pump Failure, Heat exchanger malfunction, Clots: oxygenator, Clots: bridge, Clots: bladder, Clots: hemofilter, Clots: other, Air in circuit, Cracks in pigtail connectors, Cannula problems
- **Patient Complication** = Any complication not classified as mechanical



DEVICE MORTALITY BY OXYGENATOR



- View overall mortality for oxygenators, and then break down by patient sub-group.





RISK ADJUSTMENT OVERVIEW

RISK MODEL

- Separate models for separate populations
- Incorporate published models
- Model applies to as many patients as possible



POPULATIONS

ADULT (18 YEARS OR OLDER)

- Respiratory
- Cardiac
- ECPR

PEDIATRIC (29 DAYS – 17 YEARS) AND NEONATAL (0- 28 DAYS)

- Pediatric Respiratory
- Neonatal Respiratory
- Pediatric + Neonatal Cardiac
- Pediatric + Neonatal ECPR



PUBLISHED MODELS AS OF JULY 2018

ORIGINAL ARTICLE



Predicting Survival after Extracorporeal Membrane Oxygenation for Severe Acute Respiratory Failure
The Respiratory Extracorporeal Membrane Oxygenation Survival Prediction (RESP) Score



European Heart Journal (2015) 36, 2246–2256
doi:10.1093/eurheartj/ehv194

CLINICAL RESEARCH
Myocardial disease

Predicting survival after ECMO for refractory cardiogenic shock: the survival after veno-arterial-ECMO (SAVE)-score

Intensive Care Med (2016) 42:879–888
DOI 10.1007/s00134-016-4285-8

ORIGINAL

Development and validation of the pediatric risk estimate score for children using extracorporeal respiratory support (Ped-RESCUERS)

Ryan P. Barbaro^{1,2*}, Philip S. Boonstra³, Matthew L. Paden⁴, Lloyd A. Roberts⁵, Gail M. Annich⁶, Robert H. Bartlett⁷, Frank W. Moler² and Matthew M. Davis^{1,2,8,9}

Development and Validation of a Score to Predict Mortality in Children Undergoing Extracorporeal Membrane Oxygenation for Respiratory Failure: Pediatric Pulmonary Rescue With Extracorporeal Membrane Oxygenation Prediction Score

David K. Bailly, DO¹; Ron W. Reeder, PhD¹; Luke A. Zabrocki, MD²; Anna M. Hubbard, MD¹; Jacob Wilkes, BS¹; Susan L. Bratton, MD, MPH¹; Ravi R. Thiagarajan, MBBS, MPH^{3,4}; on behalf of the Extracorporeal Life Support Organization member centers

ORIGINAL ARTICLES

www.jpeds.com • THE JOURNAL OF PEDIATRICS

Development and Validation of the Neonatal Risk Estimate Score for Children Using Extracorporeal Respiratory Support

Ryan P. Barbaro, MD, MSc^{1,2}, Robert H. Bartlett, MD³, Rachel L. Chapman, MD⁴, Matthew L. Paden, MD⁵, Lloyd A. Roberts, MBBS^{6,7}, Achameleh Gebremariam, MS², Gail M. Annich, MD, MS⁸, and Matthew M. Davis, MD, MAPP^{1,2,8,10}

ASAIO Journal 2016

Clinical Critical Care

Development of Risk Indices for Neonatal Respiratory Extracorporeal Membrane Oxygenation

TIMOTHY M. MAUL,*† BRADLEY A. KUCH,‡ and PETER D. WEARDEN*†

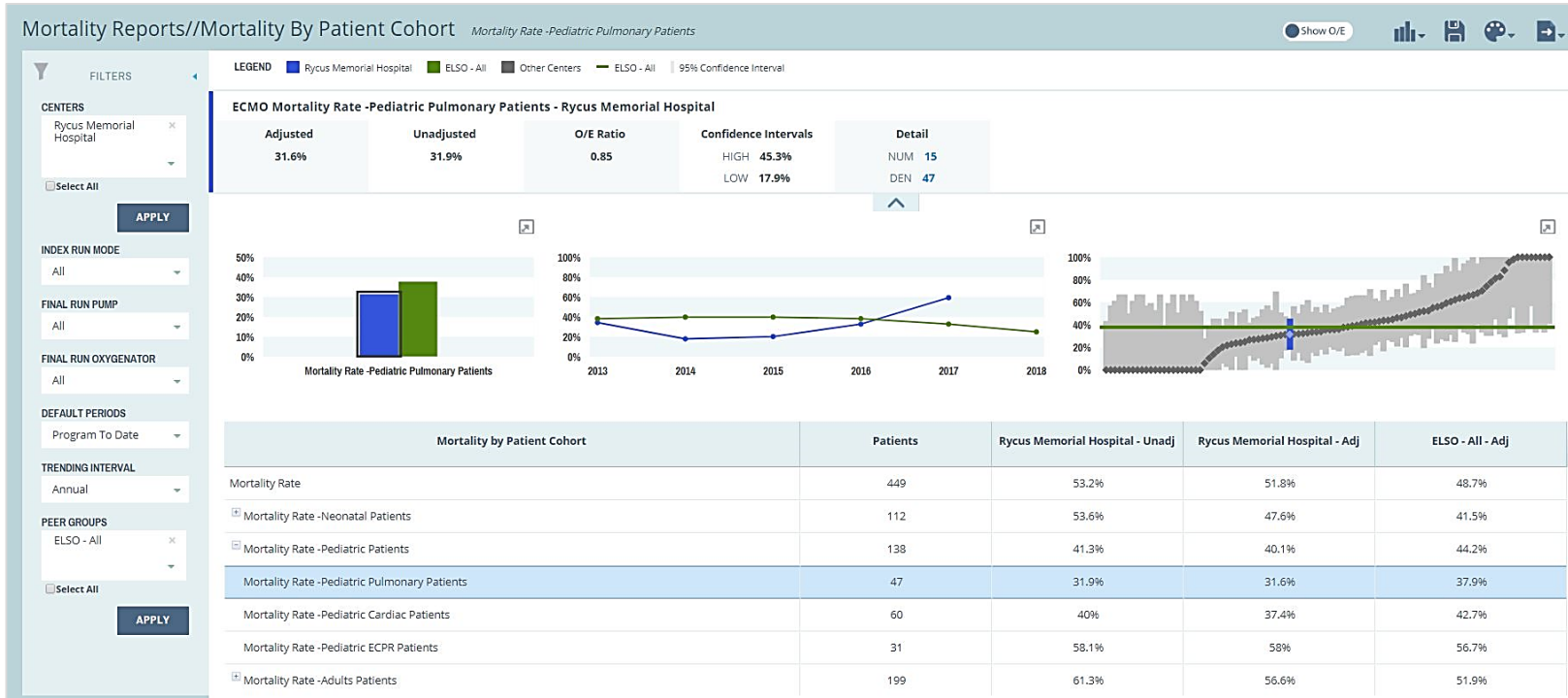


MODEL APPLIES TO AS MANY PATIENTS AS POSSIBLE

- ArborMetrix built models using variables that had < 10% missing in ELSO
- ArborMetrix built models where no published model existed
- If an Adult Respiratory patient has all the information to build RESP + ArborMetrix the two models are averaged
- If only the patient is missing data to make the RESP score then only the ArborMetrix model is used.



MORTALITY BY PATIENT COHORT



- Data is displayed in bar chart, scatter plot and caterpillar plot formats. Each element can be drilled down into detail.
- Anonymous ELSO benchmark data is displayed in green





RUN DETAIL DATA

DATA INTEGRATION OVERVIEW

- Sunday, 12:00-1:30 AM EST: Weekly data update window
- To report an issue with your data, please contact the ELSO office: support@ELSO.org



RUN LIST

ECLS Run List

Unique ID	Run	Birthdate	Age (Years)	Time On	Time Off	Run Length (Hours)	Support Type	Center ID
6100123456	1	6100123456	0	6100123456	6100123456		Pulmonary	6100123456
6100123456	1	6100123456	18	6100123456	6100123456	23	Pulmonary	6100123456
6100123456	1	6100123456	41	6100123456	6100123456	134	Pulmonary	6100123456
6100123456	1	6100123456	26	6100123456	6100123456	92	Cardiac	6100123456
6100123456	1	6100123456	38	6100123456	6100123456	138	Cardiac	6100123456

- Use filters to search for specific records; click each column to re-sort
- Click the Export icon in the top right corner to Export the list to Excel



RUN SUMMARY

ECLS Run List Search > **Details** Export ⓘ < Record 2 of 10000 >

Run Number:1, Support Type:2,

Run Summary ● Run Info ● Pre ECLS Assessment ● ECLS Assessment ● Pre-ECLS Support ● Run Detail Information ● Equipment ● Diagnosis ● Procedures ● Complications ● Outcome

🔍 Run Summary

Patient Summary

Patient Age (Years)	Time On ECMO	Time Off ECMO	Run Length (Hours)
37.23			71
Discharge Date	Length of Stay (Days)	Support Type	Membrane Lung
	9.3	Cardiac	Maquet QUADROX-iD PLS Adult (blue)
Membrane Lung Manufacturer	Blood Pump	Blood Pump Manufacturer	Discharge Disposition
Maquet/Getinge	CardioHelp	Maquet/Getinge	Alive

Major Complications

Brain death	CNS Infarction (US or CT or MRI)	Intraventricular CNS hemorrhage (US or CT or MRI)	CPR Required
No	No	No	No
Tamponade (blood)	Pulmonary hemorrhage	Fasciotomy	Amputation
No	No	No	No



RUN INFO

- Run Summary
- Run Info
- Pre ECLS Assessment
- ECLS Assessment
- Pre-ECLS Support
- Run Detail Information
- Equipment
- Diagnosis
- Procedures
- Complications
- Outcome

[-] Run Info

> Run Information

Run Number	Weight (in Kilograms)	Height (in Centimeters)	Hours on ECMO
1	69.9	170.2	181.9
Support Type			
ECPR			



PRE-ECLS ASSESSMENT

● Run Summary	● Run Info	● Pre ECLS Assessment	● ECLS Assessment	● Pre-ECLS Support	● Run Detail Information	● Equipment	● Diagnosis	● Procedures	● Complications	● Outcome
---------------	------------	-----------------------	-------------------	--------------------	--------------------------	-------------	-------------	--------------	-----------------	-----------

☰ Pre ECLS Assessment

∨ Blood Gases

pH	PCO2	PO2	HCO3
7.48	26.9	99.8	23
SaO2	Lactate		
98	2.2		

∨ Vent Settings

Vent	FIO2	Rate	Mean Airway Pressure
Conventional Ventilator	80	18	
PEEP	PIP/P	Hand bagging	
5		Unavailable	

∨ Hemodynamics

SBP	DBP	MAP	SVO2
60	45	52	
PCWP	SPAP	DPAP	MPAP
CI			



ECLS ASSESSMENT

- Run Summary
- Run Info
- Pre ECLS Assessment
- ECLS Assessment
- Pre-ECLS Support
- Run Detail Information
- Equipment
- Diagnosis
- Procedures
- Complications
- Outcome

[-] ECLS Assessment

[-] Blood Gases

pH	PCO2	PO2	HCO3
7.41	45	144.8	21
SaO2	Lactate		
99	0.7		

[-] Vent Settings

Vent	FIO2	Rate	Mean Airway Pressure
Conventional Ventilator	35	12	
PEEP	PIP/P	Hand bagging	
8		Unavailable	

> Hemodynamics

> Blood Pump Flow Rates



PRE-ECLS SUPPORT

● Run Summary ● Run Info ● Pre ECLS Assessment ● ECLS Assessment ● Pre-ECLS Support ● Run Detail Information ● Equipment ● Diagnosis ● Procedures ● Complications ● Outcome

☰ Pre-ECLS Support ≡ View Row

Support Code	Support Code Description
● 201	Cardiopulmonary bypass
● 104	Cardiac pacemaker
● 604	Norepinephrine
● 101	Vasopressor/inotropic drugs
● 602	Dobutamine

> Pre-ECLS Support

Admit Date	Patient Transported
Pre-ECLS Cardiac Arrest	Bridge to Transplant
Yes	No
Support Code	Support Code Description
201	Cardiopulmonary bypass



RUN DETAIL INFORMATION

● Run Summary ● Run Info ● Pre ECLS Assessment ● ECLS Assessment ● Pre-ECLS Support ● **Run Detail Information** ● Equipment ● Diagnosis ● Procedures ● Complications ● Outcome

☰ Run Detail Information ⚙ View Row

Start Time	End Time	Mode
●		Venoarterial

› Run Detail Information

Start Time

End Time

Mode

Venoarterial



EQUIPMENT

● Run Summary ● Run Info ● Pre ECLS Assessment ● ECLS Assessment ● Pre-ECLS Support ● Run Detail Information ● **Equipment** ● Diagnosis ● Procedures ● Complications ● Outcome

☰ Equipment ☰ View Row

↕ Run Number

- 1

> Equipment

Membrane Lung - Manufacturer Maquet/Getinge	Membrane Lung - Device Quadrox iD 7.0 (Adult)
Heat Exchanger - Manufacturer Maquet/Getinge	Heat Exchanger - Device Quadrox Integrated
Blood Pump - Manufacturer Levitronix/Thoratec/St Jude	Blood Pump - Device Levitronix CentriMag Centrifugal 3/8
Hemofilter - Manufacturer	Hemofilter - Device



DIAGNOSIS

● Run Summary ● Run Info ● Pre ECLS Assessment ● ECLS Assessment ● Pre-ECLS Support ● Run Detail Information ● Equipment ● **Diagnosis** ● Procedures ● Complications ● Outcome

☰ Diagnosis ⚙ View Row

Primary	ICD 10 Code	Legacy ICD 9 Code
● --	J93	--
● --	I26	--

Diagnoses

External Diagnosis ID
8FF5DF61-D3D0-4BD7-9C4A-C83F0EF74B6C

ICD 9

ICD 10
J93

Primary Diagnosis?
No



PROCEDURES

● Run Summary ● Run Info ● Pre ECLS Assessment ● ECLS Assessment ● Pre-ECLS Support ● Run Detail Information ● Equipment ● Diagnosis ● Procedures ● Complications ● Outcome

☰ Procedures ☰ View Row

↕ Run Number	↕ Date/Time	↕ Estimated	↕ CPT Code
● 1		--	A9700
● 1		--	A9700
● 1		--	A9700

➤ Procedures

Date/Time

Estimated

No

CPT Code

A9700



COMPLICATIONS

● Run Summary ● Run Info ● Pre ECLS Assessment ● ECLS Assessment ● Pre-ECLS Support ● Run Detail Information ● Equipment ● Diagnosis ● Procedures ● **Complications** ● Outcome

☰ Complications

◆ Date/Time	◆ Complication	◆ Code
●	Neurologic: Brain death	301

☰ View Row

- Complications
 - Date/Time
 - Complication
 - Neurologic: Brain death
 - Code
 - 301



OUTCOME

● Run Summary ● Run Info ● Pre ECLS Assessment ● ECLS Assessment ● Pre-ECLS Support ● Run Detail Information ● Equipment ● Diagnosis ● Procedures ● Complications ● Outcome

☰ Outcome

> Outcome

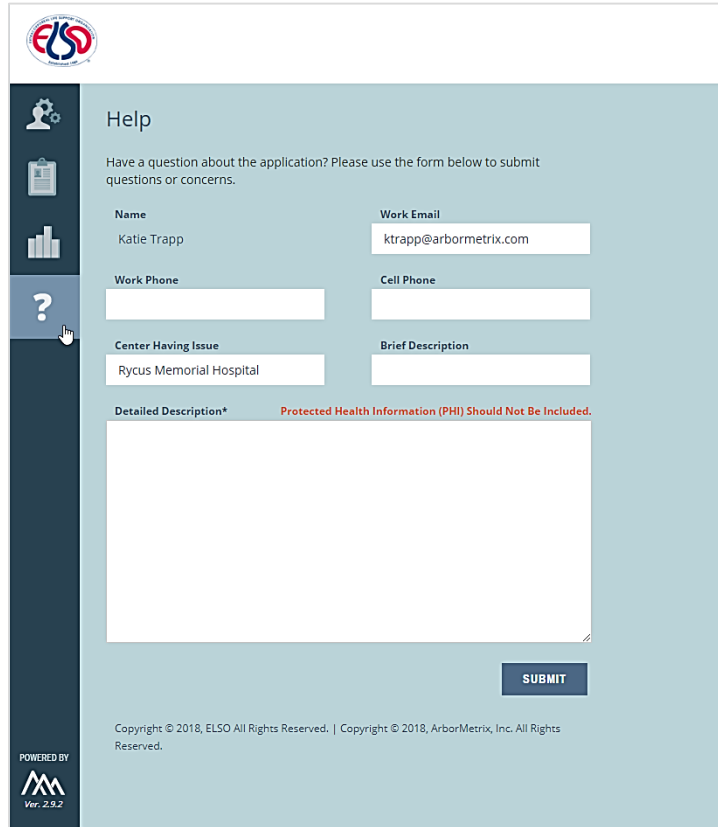
Discontinuation Reason	Extubation Date	Cannula Site Repair	Discharged Alive
Recovery from ECLS		None	Yes
Discharge Date	Discharge Location		





QUESTIONS?

SUBMITTING A HELP REQUEST



The screenshot shows a web form for submitting a help request. At the top left is the ELSO logo. Below it is a vertical sidebar with icons for a person, a clipboard, a bar chart, and a question mark. The main content area is titled 'Help' and contains the following fields:

- Name:** Katie Trapp
- Work Email:** ktrapp@arbormetrix.com
- Work Phone:** (empty field)
- Cell Phone:** (empty field)
- Center Having Issue:** Rycus Memorial Hospital
- Brief Description:** (empty field)
- Detailed Description*:** (large empty text area)

Below the 'Detailed Description*' field is a red warning: "Protected Health Information (PHI) Should Not Be Included." At the bottom right of the form is a blue 'SUBMIT' button. At the bottom left, it says 'POWERED BY' with a logo and 'Ver. 2.9.2'. At the bottom center, there is a copyright notice: "Copyright © 2018, ELSO All Rights Reserved. | Copyright © 2018, ArborMetrix, Inc. All Rights Reserved."

- Submit a help desk request within the application or directly to ELSOsupport@arbormetrix.com
- If you have questions about your data, contact Peter Rycus or email the ELSO coordinating center: Support@ELSO.com



Specify. Measure. Act.

ArborMetric