

Integrating Epic and the Spectrum Medical EMR

Bob Longenecker, LCP, CCP
Manager of Perfusion Services
ECMO Coordinator
Mercy Hospital St. Louis



The Missouri Perfusion Society Annual Meeting
June 3, 2017

DISCLOSURE

- Employed by Mercy Hospital St. Louis since April, 1984
- Manager of Perfusion Services
- ECMO Coordinator
- New Technologies Committee Coordinator
- Administrative Co-Lead Mercy Healthcare Cardiac Surgery Specialty Council

“It was very painful”

“But it’s done” I said

Verbal communication to me in Boston
May, 2017

THE NEED

- How do we effectively chart cardiopulmonary bypass and get information into Epic when the timeframe involves days and or weeks instead of a few hours? (*I really want this for both of my needs*).
- What capital equipment needs are there?
- What implications are there for Mercy Technology Services (MTS)?
- What implications are there for the Epic team?
- How do we create the interface?
- **And**, I know via the Mercy CTS Specialty Council, that there is a need throughout Mercy for perfusion EMR capability in all of the hospitals.
- **GOAL:** find a vendor that fits everyone's needs and make it an enterprise solution throughout Mercy.
- St. Louis was the first to bat in this game, so get it right and build on it so that all Mercy perfusionists benefit from this work.

THE PREPARATION

- Decide what I want this to do for me.
- Pick a vendor for a perfusion EMR.
- This product must do more than create a perfusion record on a document that can be viewed (i.e. a PDF media file).
- This product must allow 2-way communication between the hardware and the Mercy network (Epic)
- Needs to be able to accept an ADT feed and have an HL7 interface.
- Build the cost into the ECMO 5 year pro forma.
- Place capital into the Capital Request Committee (CRC) process; identified in the ECMO 5 year pro forma.
- Assist in creating the business plan for MTS and Epic integration.
- Be the facilitator between MTS, Epic Team, and administration.

THE REALITY

- I need an EMR for ECMO and an EMR for perfusion in the CVOR.
- Each one is going to cost a lot of money.
- I **cannot** expect to pick a different vendor for each application. One vendor had to be able to ultimately supply both needs.
- That meant one vendor had to be able to function with a wide variety of equipment, both in St. Louis and other Mercy facilities (if we are being good stewards of Mercy's financial resources).
- I knew early on that I get a single option for third party Epic integration.
- I had no idea what it would take to both create a local perfusion EMR and integrate it into Epic.
- It means allowing a non-Mercy entity access to Mercy's network.
- Mercy guards their network like Fort Knox. There's a big legal issue here with allowing access to third party vendors.
- This will likely be a multi-phased endeavor.

HOW DO I GET THIS INFO INTO EPIC?



EQUIPMENT PURCHASED

- Quantum workstation (3) with VIPER software.
- M3 functionality (saturations, Hgb, flow).
- Additional “m” functionality would have to come later.
- On-site installation & configuration.
- Sentinel & Vigilance Total Care.**
- The rest of the ECMO equipment (heater/cooler, etc.).

**

Once this becomes a standard Mercy Healthcare will make it an enterprise solution and pick up the annual cost for software & maintenance.

EQUIPMENT FOR THE FUTURE

- Newest Quantum workstation that combines QDMU & “M” options (we actually purchased this and are awaiting its release).
- Spectrum M4 functionality.
- Includes: gas module & CO2 exhaust sensor.
- Gas module provides F_iCO_2 , F_iO_2 , and total sweep.
- CO2 exhaust sensor provides F_eCO_2 .
- Using those inputs, plus the SaO_2 , SvO_2 , blood flow, and Hemoglobin, we can then predict PaO_2 and $PaCO_2$.
- That makes these calculations available to us: VCO_2 , DO_2 , VO_2 , oxygen extraction ratio.
- Calculations can also be indexed to BSA.
- Ratio of oxygen delivery to CO2 production.

COMMUNICATION WISHES

- CentriMag and CardioQuip information sent to Quantum (flow, RPM, pressures, temperatures).
- CVICU Phillips monitor patient data sent to Quantum.
- Bi-directional communication between Quantum & Epic for charting, checklists, lab data, etc.
- Capturing of gas data (sweep flow, FIO2) from blender.
- Functionality regardless of where the patient was located.

COMMUNICATION ISSUES

- Latest generation CentriMag pump console has no RS232 communication port.
- The CentriMag monitor has a European-spec communications port that is not FDA certified (and apparently never will be).
- The CardioQuip mini heater/cooler has no temperature monitoring inputs and Bob didn't specify inclusion of a data output.
- The Phillips monitors in our CVICU have no network cards for data output (we need to buy those too).
- Spectrum integration into Epic would need to be multi-phased, so bi-directional communication would not be ready by ECMO program launch date.
- We need to assure network access for Spectrum in the CVICU and CVOR.
- No blender sold in the USA has a digital output, meaning we would not be able to capture gas data electronically.

FACILITY CONSIDERATIONS

- We would only provide ECMO in 3 rooms in our CVICU; the 3 largest, and those monitors would be configured for network cards for patient data output.
- Spectrum required a virtual server space be created by MTS.
- Spectrum functionality necessitated Mercy approved access by the Spectrum company to Mercy Healthcare's network (Legal Department had to get involved).
- Initially we would not have network access anywhere but the CVICU (not available initially in the CVOR, cath lab, or anywhere else).
- Mercy would require that Spectrum had to be hard-wired to the network, meaning no wireless would be allowed.

THE PLAN

- Mercy required a business plan to implement Spectrum for ECMO in a phase one, phase two, etc., plan.
- Epic support would create for us a St. Louis-specific Adult ECMO flow sheet for the bedside RN and ECMO Specialist to use for a variety of periodic charting (we customized Springfield's existing flow sheet).
- This flow sheet would contain space for intermittent data capture and most routine checklists.
- Initially the Specialist would do their charting in the Spectrum VIPER software (on the pump) and then duplicate some of that in Epic.
- Down the road all charting would occur in the Spectrum VIPER software and this would be sent directly into the Epic flow sheet.

SPECTRUM FUNCTIONALITY

- Continuous capture of pump flow, hemoglobin, arterial saturation, venous saturation.
- Sustained recording of gas sweep flow and FIO2 with display and trending (requires manual entry for each change of parameter).
- All patient and case demographics (ADT feed to capture some data).
- Continuous trending all data.
- Main Intra-operative display with key elements.
- Space to record a wide variety of laboratory test data.
- All checklists with manual entry. (hourly equipment, pump settings, hourly circuit clot assessment, change of shift, transport).
- Event chart summary with notation abilities.
- Eventually: communication of all of this directly into Epic.

THE PROCESS (*sometimes painful*)

- All hardware purchased (QDMU, M2, which later became M3 since we needed more functionality).
- Work with Spectrum to plan for connectivity with our hardware.
- Mercy MTS sets up a virtual server which includes 1 test database, 1 test applications database, 1 production database, 1 production applications database.
- Spectrum makes a site visit to Mercy St. Louis to view our infrastructure in all areas where their product will be utilized, identifies potential issues.
- Spectrum goes through process with Mercy MTS and legal department to gain access to our network.
- Both sides sign legal documents.
- Spectrum installs their software remotely; given a unique VPN (encrypted connection).
- MTS configures QDMU to be able to talk to the Mercy server.
- Manual test.

MTS RESTRICTIONS

- The vendor (Spectrum) must go through a security review by Mercy.
- They have many forms to sign off on to meet Mercy's criteria for network access.
- Spectrum employee visits and meets with our chief of security to discuss these issues.
- Mercy makes sure that Spectrum's facilities, equipment, software meets our standards and protects our data so that Mercy information is secure.
- Anytime Spectrum needs to remote in to Mercy's network they are given access via a challenge question, password reset, and then granted access which will expire at midnight (cannot enter the network independently of Mercy's protocol which requires our contact to initiate the access process).

IMPLEMENT THE PLAN

- Bob sits down and works from the Springfield Epic Adult ECMO flow sheet and formulates a new one for St. Louis.
- Multiple meetings with Epic Team to design and build the new flow sheet.
- Parallel to this work is the Spectrum process.
- **PHASE ONE** creates the ADT communication between Mercy's network and Spectrum.
- It includes communication of the Spectrum ECMO record into the Mercy virtual server.
- That's it! For now the flow sheet is filled out in Epic, and a nearly identical set of data is entered into Spectrum via multiple checklists and data entry screens.
- **PHASE TWO** will enable charting in the QDMU and that information will populate lines in the Adult ECMO flow sheet in Epic (one way).
- It will also include implementing communication between the patient monitor vitals into the QDMU (didn't get done in phase one).
- **PHASE THREE** will hopefully include Spectrum gas analytics.

EPIC ADULT ECMO FLOWSHEET

Flowsheets

Summary
Chart Review
Care Everywhere...
Results Review
Pathway Review
Problem List
Notes
Manage Orders
Navigators
Discharge
FYI
Flowsheets
Patient Station

File Add Rows Add LDA Cascade Add Col Insert Col Last Filed Reg Doc Graph Go to Date Values By Refresh Legend Link Lines

IntraOp I and O Mallampati Post-Op Simple Vitals Autotransfusion Transfusion Admin Record **Adult ECMO** Acuity Viral Screening HIV Screeni Adult ECMO

Mode: Accordion Expanded View All

Reset Now

ECMO Location		Mercy Heart Hospital St Louis CVICU		
		5/23/17		Last Filed Value
		1610	1615	
ECMO Medical Staff	✓			
Adult ECMO	✓			
Monitored Vitals	✓			
Hemodynamic Monitoring	✓			
Non-Invasive Cardiac Outpu...	✓	Where is ECMO being delivered?		Mercy St. L...
ECMO Pump Settings (Hourly)	✓	ECMO Medical Staff		
Equipment & Circuit Assess...	✓	Surgeon		Cleveland
Circuit Blood Clot Assessme...	✓	ECMO Specialist		Megan Smit...
Equipment & Circuit Assess...	✓	Intensivist On-Call		Plisco
ECMO Cannulas 05/22/17 1...	✓	Perfusionist On-Call		Bob
ECMO Cannulas 05/21/17 1...	✓	Adult ECMO		
ECMO Cannulas 05/21/17 1...	✓	Type		VV
Arterial Gases	✓	Date ECMO Run Started		5/21/2017
Labs	✓	Oxygenator Type		QuadRox
Provider Notification	✓	ECMO Cart		B
		Date Last Circuit Change		
		Daily Perfusionist Equipment & Circuit Check		
		Monitored Vitals		
		Temp		96.8 (36)
		Temp src		Core
		Hypo/Hyperthermia Device In Use		
		Pulse		69
		Heart Rate		69 bpm
		ECG - Rhythm		normal sinu...
		BP		125/69
		Mean Arterial Pressure		77 MM HG
		BP Location		Left lower le...
		Resp		18
		SpO2		90 %
		HOB Elevation		30 DEGREE...
		Arterial BP		104/52
		MAP Invasive		66 mmHg
		End Tidal CO2		32 mmHg

More Uncheck All Check All

ROBERT LONGENECKER 0 Future/Standing Orders 4:40 PM

EPIC ADULT ECMO FLOWSHEET

Flowsheets ? Resize

Summary | Chart Review | Care Everywhere... | Results Review | Pathway Review | Problem List | Notes | Manage Orders | Navigators | Discharge | FYI | Flowsheets | Patient Station

File | Add Rows | Add LDA | Cascade | Add Col | Insert Col | **Last Filed** | Reg Doc | Graph | Go to Date | Values By | Refresh | Legend | Link Lines

Care Everywhere... IntraOp I and O | Mallampati | Post-Op Simple Vitals | Autotransfusion | Transfusion Admin Record | **Adult ECMO** | Acuity | Viral Screening | HIV Screeni | Adult ECMO

Results Review **ECMO Location** Mode: Accordion Expanded Reset Now

Pathway Review ECMO Medical Staff
Adult ECMO

Problem List **Monitored Vitals**

Mercy Heart Hospital St Louis CVICU			
	5/23/17		Last Filed Value
	1610	1615	
End Tidal CO2			32 mmHg
Oxygen Therapy O2 Device			mechanical ...
Oxygen Therapy Flow (L/min)			15
FIO2%			100
Safety Instructions			
Equipment Changed Date			
Chin Lift			
Intra Abdominal Pressure			13 mmHg
Hemodynamic Monitoring			
CVP			17 mmHg
ScvO2 Central Venous O2 Sat%			
PAP			
PAM			
PCWP			
LAP BP			
LAP MAP			
CO Injectate Volume (mL)			
Cardiac Output			
Cardiac Index			
SVO2 (%)			
RVSW			
LVSW			
RVSWI			
LVSWI			
SVR			
SVRI			
PVR			
PVRI			
Stroke Volume			
Stroke Volume Index			

ECMO Cannulas 05/22/17 1... Equipment & Circuit Assess...
ECMO Cannulas 05/21/17 1... Equipment & Circuit Assess...
ECMO Cannulas 05/21/17 1... Intra Abdominal Pressure

Arterial Gases
Labs
Provider Notification

Uncheck All | Check All

EPIC ADULT ECMO FLOWSHEET

Flowsheets ? Resize

Summary File Add Rows Add LDA Cascade Add Col Insert Col Last Filed Reg Doc Graph Go to Date Values By Refresh Legend Link Lines

Care Everywhere... IntraOp I and O Mallampati Post-Op Simple Vitals Autotransfusion Transfusion Admin Record Adult ECMO Acuity Viral Screening HIV Screeni Adult ECMO

Results Review **ECMO Location** **Mode:** Accordion Expanded View All Reset Now

Pathway Review **ECMO Medical Staff** **ECMO Location** **Adult ECMO** **Monitored Vitals** **ECMO Pump Settings (Hourly)** **Equipment & Circuit Assessment (Hourly)** **Circuit Blood Clot Assessment (Hourly)**

Problem List **ECMO Medical Staff** **Adult ECMO** **Monitored Vitals** **ECMO Pump Settings (Hourly)** **Equipment & Circuit Assessment (Hourly)** **Circuit Blood Clot Assessment (Hourly)**

Notes **ECMO Medical Staff** **Adult ECMO** **Monitored Vitals** **ECMO Pump Settings (Hourly)** **Equipment & Circuit Assessment (Hourly)** **Circuit Blood Clot Assessment (Hourly)**

Manage Orders **ECMO Medical Staff** **Adult ECMO** **Monitored Vitals** **ECMO Pump Settings (Hourly)** **Equipment & Circuit Assessment (Hourly)** **Circuit Blood Clot Assessment (Hourly)**

Navigators **ECMO Medical Staff** **Adult ECMO** **Monitored Vitals** **ECMO Pump Settings (Hourly)** **Equipment & Circuit Assessment (Hourly)** **Circuit Blood Clot Assessment (Hourly)**

Discharge **ECMO Medical Staff** **Adult ECMO** **Monitored Vitals** **ECMO Pump Settings (Hourly)** **Equipment & Circuit Assessment (Hourly)** **Circuit Blood Clot Assessment (Hourly)**

FYI **ECMO Medical Staff** **Adult ECMO** **Monitored Vitals** **ECMO Pump Settings (Hourly)** **Equipment & Circuit Assessment (Hourly)** **Circuit Blood Clot Assessment (Hourly)**

Flowsheets **ECMO Medical Staff** **Adult ECMO** **Monitored Vitals** **ECMO Pump Settings (Hourly)** **Equipment & Circuit Assessment (Hourly)** **Circuit Blood Clot Assessment (Hourly)**

Patient Station **ECMO Medical Staff** **Adult ECMO** **Monitored Vitals** **ECMO Pump Settings (Hourly)** **Equipment & Circuit Assessment (Hourly)** **Circuit Blood Clot Assessment (Hourly)**

Customize More Uncheck All Check All

Mercy Heart Hospital St Louis CVICU			
5/23/17			
	1610	1615	Last Filed Value
ECMO Pump Settings (Hourly)			
RPM Setting	4000		4000
Flow Setting	4.32		4.32
Sweep Gas Setting	9		9
FiO2 Setting	100		100
Pre-Oxygenator Saturation	80		80
Post-Oxygenator Saturation	98		98
Pre-Pump Pressure (P1)	-79		-79
Pre-Oxygenator Pressure (P2)			260
Post-Oxygenator Pressure (P3)	260		260
Heater-Cooler Water Temp Setting	36		36
Heater-Cooler Water Temp Actual	36		36
Oxygenator Arterial Blood Temp	35.2		35.2
Equipment & Circuit Assessment (Hourly)			
Circuit Plugged into Red Outlet	Yes		Yes
Pump Battery Charged	Yes		Yes
Spare Pump Console/Drive Monitor with Cart	Yes		Yes
Tubing Clamps on Pump	Yes		Yes
Oxygen Source/Line Checked	Yes		Yes
Flashlight Available/Working	Yes		Yes
Pressure Transducers Checked/Functional	Yes		Yes
Circuit Blood Clot Assessment (Hourly)			
Venous (Drainage) Cannula Dressing Inspection	Dry		Dry
Venous Cannula Connector to Venous Tubing	No blood clot		No blood clo...
Connector/Pigtail for P1 Site	No blood clot		No blood clo...
Centrifugal Pump Inlet Connector	No blood clot		No blood clo...
Centrifugal Pump Internal Space	No blood clot		No blood clo...
Centrifugal Pump outlet	No blood clot		No blood clo...
Tubing to Oxygenator Inlet Connector with Pigtail P2 Site	No blood clot		No blood clo...
Venous Side of Oxygenator	No blood clot visible		No blood clo...

ROBERT LONGENECKER 0 Future/Standing Orders 4:42 PM

EPIC ADULT ECMO FLOWSHEET

Flowsheets ? Resize

File Add Rows Add LDA Cascade Add Col Insert Col Last Filed Reg Doc Graph Gg to Date Values By Refresh Legend Link Lines

Care Everywhere... IntraOp I and O Mallampati Post-Op Simple Vitals Autotransfusion Transfusion Admin Record **Adult ECMO** Acuity Viral Screening HIV Screeni Adult ECMO

Results Review **ECMO Location** Mode: Accordion Expanded View All Reset Now

Pathway Review ECMO Medical Staff

Problem List Adult ECMO Monitored Vitals

Hemodynamic Monitoring

Notes Non-Invasive Cardiac Outpu... ECMO Pump Settings (Hourly) Equipment & Circuit Assess... Circuit Blood Clot Assessme... Equipment & Circuit Assess... ECMO Cannulas 05/22/17 1... ECMO Cannulas 05/21/17 1... ECMO Cannulas 05/21/17 1...

Manage Orders Arterial Gases Labs Provider Notification

Navigators Discharge FYI

Flowsheets

Patient Station

Customize More Uncheck All Check All

Mercy Heart Hospital St Louis CVICU				
5/23/17				
	1610	1615	Last Filed Value	
Circuit Blood Clot Assessment (Hourly)				
Venous (Drainage) Cannula Dressing Inspection	Dry			Dry
Venous Cannula Connector to Venous Tubing	No blood clot			No blood clo...
Connector/Pigtail for P1 Site	No blood clot			No blood clo...
Centrifugal Pump Inlet Connector	No blood clot			No blood clo...
Centrifugal Pump Internal Space	No blood clot			No blood clo...
Centrifugal Pump outlet	No blood clot			No blood clo...
Tubing to Oxygenator Inlet Connector with Pigtail P2 Site	No blood clot			No blood clo...
Venous Side of Oxygenator	No blood clot visible			No blood clo...
Arterial Side of Oxygenator	No blood clot visible			No blood clo...
Oxygenator Outlet Connector with Pigtail P3 Site to Tubing	No blood clot			No blood clo...
Arterial Connector with Supplemental Pigtail Site	No blood clot			No blood clo...
Arterial Tubing to Arterial Cannula Connector	No blood clot			No blood clo...
Arterial (Infusion) Cannula Dressing Inspection	Dry			Dry
Equipment & Circuit Assessment q Shift/Post Transport				
Circuit Plugged into Red Outlet				Yes
Pump Battery Charged/Charging				Yes
Suply Cart in Room				Yes
Tubing Clamps on Pump				Yes
Oygen Source/Line Checked				Yes
Oxygenator Sighed				Yes
Pump Console Flow Probe Moved 1-2" to New Location on Arterial Line				Yes
Pressure Transducers Checked/Functional				Yes
Pressure Transducer Cables Attached				Yes
Tie Bands at All Tubing/Oxygenator Connections				Yes
Flashlight Available/Working				Yes
ECMO Cannulas 05/22/17 1700 Right Internal Jugular- 17 Superior Vena Cava-				
Properties	Placement Date/Time: 05/22/17 1700 Venous cannula:			
Arterial Cannula (WDL)				Re-assessm...
Arterial Site Signs				

ROBERT LONGENECKER Future/Standing Orders

4:43 PM

EPIC ADULT ECMO FLOWSHEET

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IntraOp I and O | Mallampati | Post-Op Simple Vitals | Autotransfusion | Transfusion Admin Record | **Adult ECMO** | Acuity | Viral Screening | HIV Screen | Adult ECMO

Mode: Accordion | Expanded | View All Reset Now

Mercy Heart Hospital St Louis CVICU	
5/23/17	
1610	1615
Last Filed Value	
ECMO Cannulas 05/22/17 1700 Right Internal Jugular- 17 Superior Vena Cava-	
Properties	Placement Date/Time: 05/22/17 1700 Venous cannula: deox
Arterial Cannula (WDL)	Re-assessm...
Arterial Site Signs	
Arterial Dressing Type/Securement	
Arterial Dressing Status/Interventions	
Arterial Dressing Change Date	
Venous Cannula (WDL)	Re-assessm...
Venous Site Signs	no redness;...
Venous Dressing Type/Securement	antimicrobial...
Venous Dressing Status/Interventions	clean;dry an...
Venous Dressing Change Date	
ECMO Cannulas 05/21/17 1330 Right Femoral Vein- Femoral Artery-	
Properties	Placement Date/Time: 05/21/17 1330 Venous cannula:
Arterial Cannula (WDL)	Re-assessm...
Arterial Site Signs	
Arterial Dressing Type/Securement	
Arterial Dressing Status/Interventions	
Arterial Dressing Change Date	
Venous Cannula (WDL)	Re-assessm...
Venous Site Signs	no redness;...
Venous Dressing Type/Securement	antimicrobial...
Venous Dressing Status/Interventions	clean;dry an...
Venous Dressing Change Date	5/23/2017
ECMO Cannulas 05/21/17 1330 Right Internal Jugular-	
Properties	Placement Date/Time: 05/21/17 1330 Venous cannula:
Arterial Cannula (WDL)	Re-assessm...
Arterial Site Signs	
Arterial Dressing Type/Securement	
Arterial Dressing Status/Interventions	

More | Uncheck All | Check All

ROBERT LONGENECKER | 0 Future/Standing Orders | 4:43 PM

EPIC ADULT ECMO FLOWSHEET

Flowsheets ? Resize

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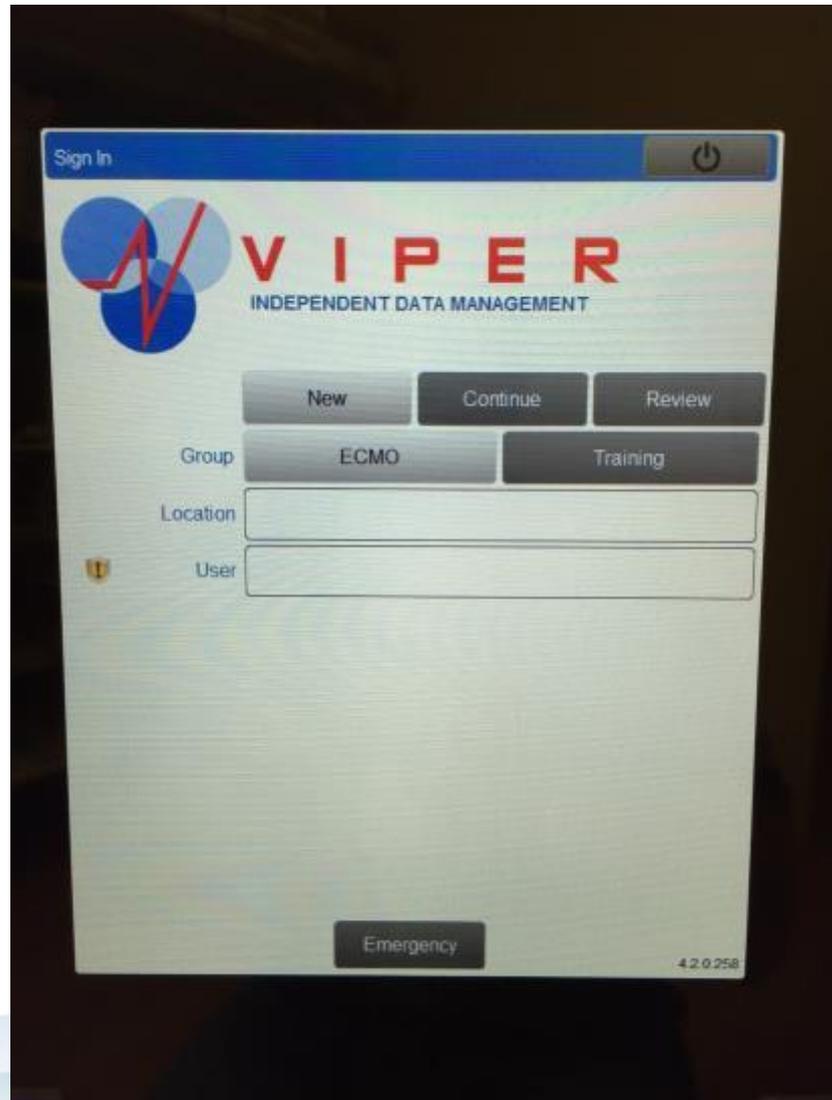
Mode: Accordion | Expanded | View All Reset Now

Mercy Heart Hospital St Louis CVICU			
5/23/17			
	1610	1615	Last Filed Value
Arterial Gases			
Draw Site			
TCO2 (Calc) POC		26	26
pH			
pH POC		7.32	7.32
pCO2			
pCO2 POC		47	47
pO2			
pO2 POC		61	61
HCO3			
HCO3 POC		24	24
Base Excess			
Base Excess POC		-2.1	-2.1
% O2 Saturation			
% O2 Saturation POC			
FiO2		100	100
FiO2 POC			
Hemoglobin ABG			
Hematocrit ABG			
Comment, Gases POC			
Labs			
ACT			188
ACT POC			
PT			16.7
INR			1.3
PTT			76
Antithrombin III			
Anti-xA			0.24
Fibrinogen			617
Platelet			62

More | Uncheck All | Check All

ROBERT LONGENECKER | Future/Standing Orders 4:45 PM

SPECTRUM VIPER QDMU



QDMU MAIN RECORD PAGE

615 S. New Ballas Road
St. Louis, MO
63141

ECMO Record

Mercy 

MRN	Name	Birth Date	Gender	Location
Account Number E1234567890				Procedure Date May 12, 2017

Patient Demographics:

MRN	Last Name	First Name	Middle Name	
Acct # E1234567890	Gender	DOB	Height	WT
Case Number	Blood Type	Age	BMI	BSA

Allergies

Procedure

Diagnosis



QDMU DEMOGRAPHICS SCREEN

Patient Demographics

MRN	<input type="text"/>	Gender	<input type="text"/>
Account Number	E1234567890	Birth Date	<input type="text"/>
Case Number	<input type="text"/>	Height	<input type="text"/>
First Name	<input type="text"/>	Weight	<input type="text"/>
Middle Name	<input type="text"/>	BSA	<input type="text"/>
Last Name	<input type="text"/>	BMI	<input type="text"/>
Blood Type	<input type="text"/>	Age	<input type="text"/>

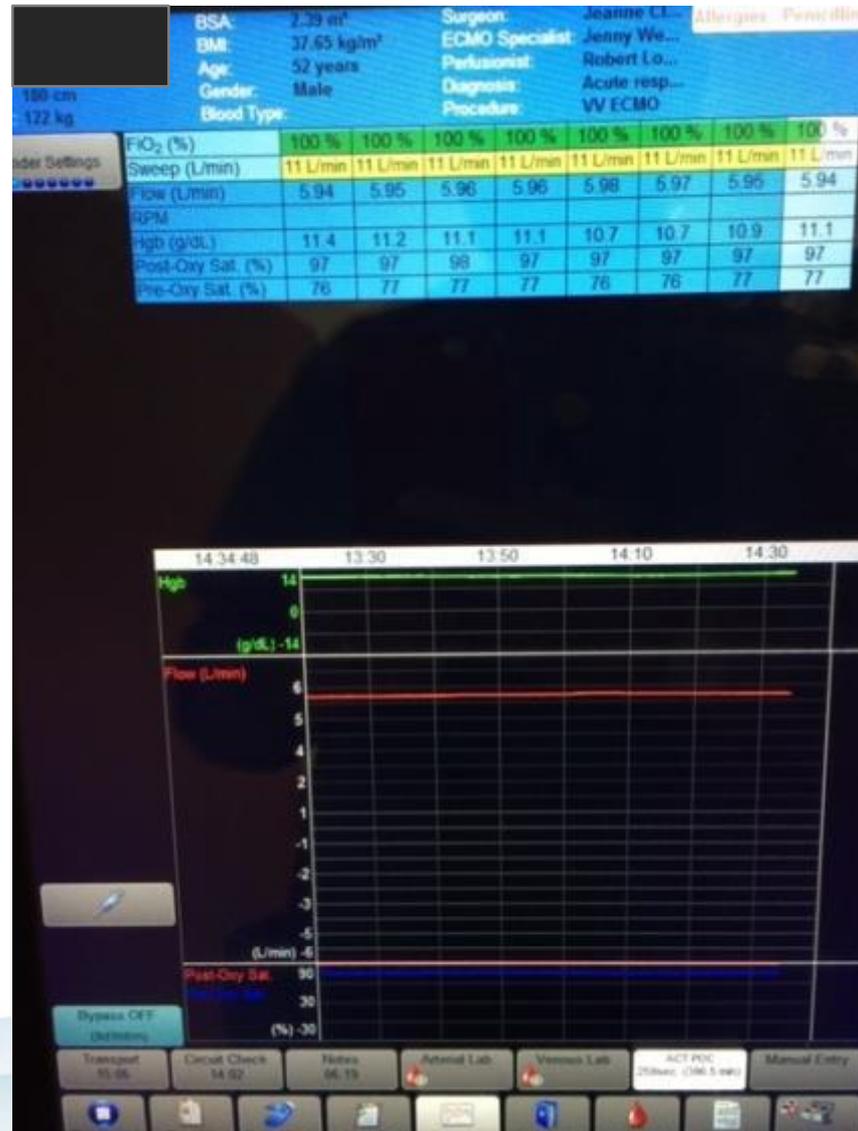
Alergies

Diagnosis

Procedure

Summary Patient Demographics Printing

QDMU INTRA-OP SCREEN



SPECTRUM M3 DISPLAY



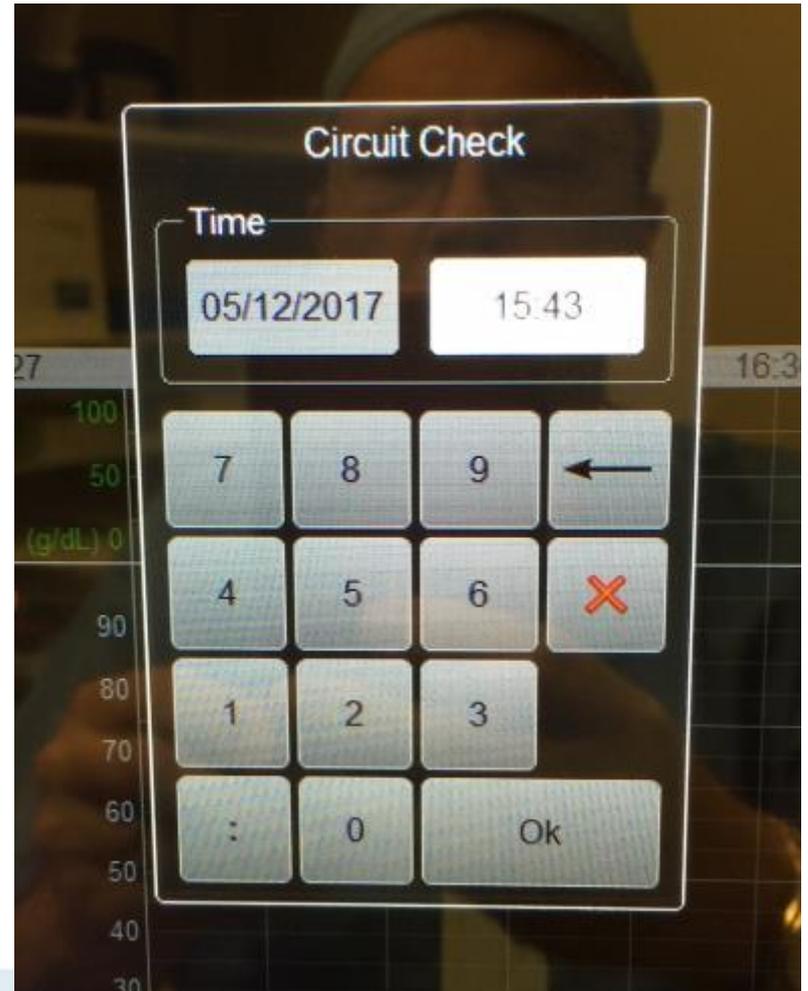
TRENDED PARAMETERS

Weight: 180 cm	BSA: 2.39 m ²	Surgeon: Jeanne Cl...	Allergies: Penicillins					
Weight: 122 kg	BMI: 37.65 kg/m ²	ECMO Specialist: Jenny We...						
	Age: 52 years	Perfusionist: Robert Lo...						
	Gender: Male	Diagnosis: Acute resp...						
	Blood Type:	Procedure: VV ECMO						
Blender Settings: 	FI _O ₂ (%)	100 %	100 %	100 %	100 %	100 %	100 %	100 %
	Sweep (L/min)	11 L/min	11 L/min	11 L/min	11 L/min	11 L/min	11 L/min	11 L/min
	Flow (L/min)	5.94	5.95	5.96	5.96	5.98	5.97	5.95
	RPM							
	Hgb (g/dL)	11.4	11.2	11.1	11.1	10.7	10.7	10.9
	Post-Oxy Sat. (%)	97	97	98	97	97	97	96
	Pre-Oxy Sat. (%)	76	77	77	77	76	76	78

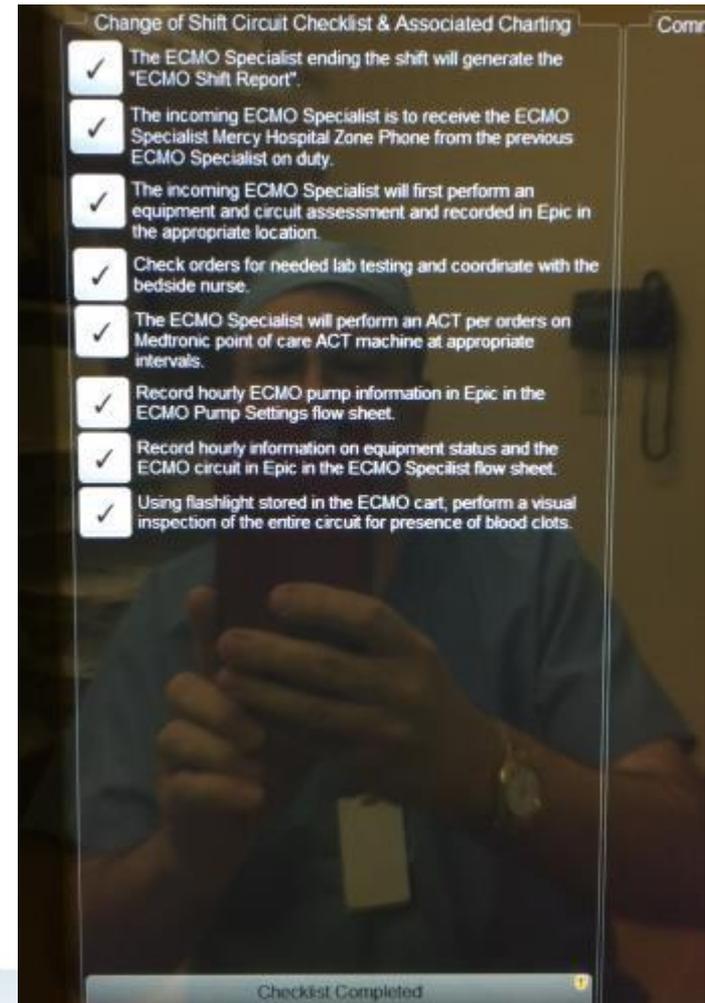
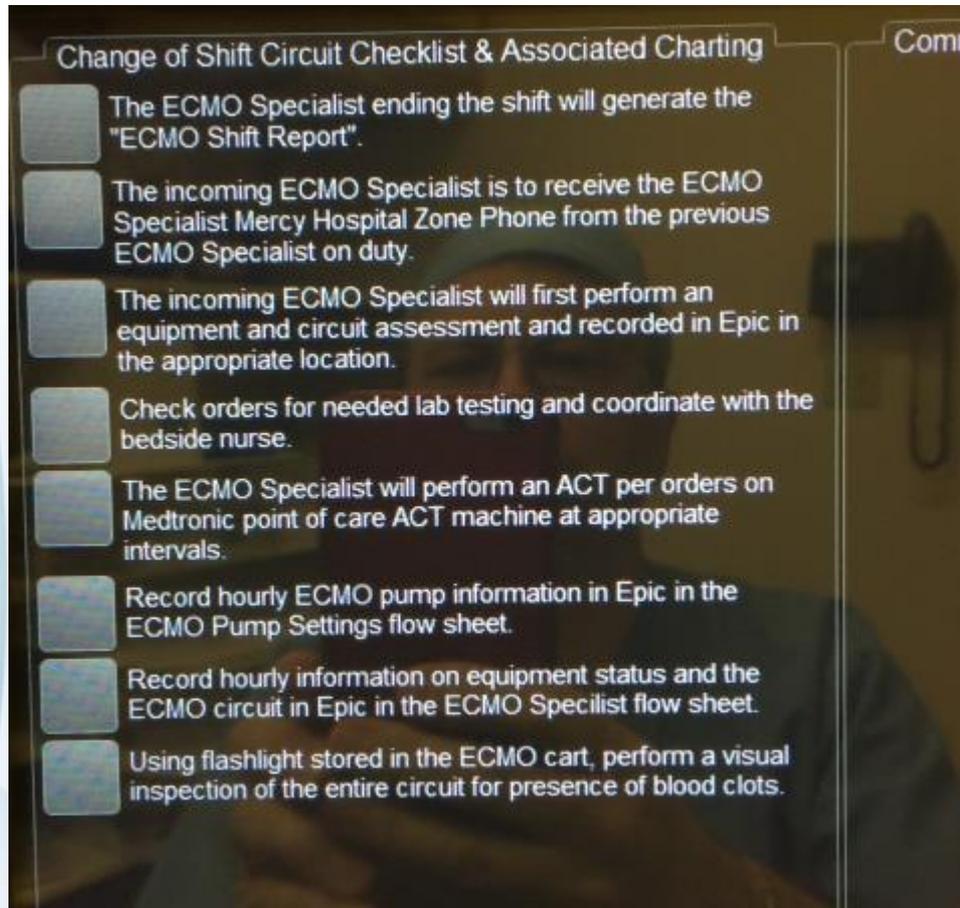
CHECKLISTS

- Preparation for ECMO initiation equipment and circuit checklist.
- Initiation of ECMO checklist.
- ECMO pump settings (hourly)
- Equipment and circuit assessment (hourly)
- Circuit clot assessment (hourly)
- Change of shift circuit checklist and associated charting.
- Equipment and circuit check Q shift/post transport.
- Transport specific to perfusionist and ECMO Specialist.
- Transport: arriving in receiving department.

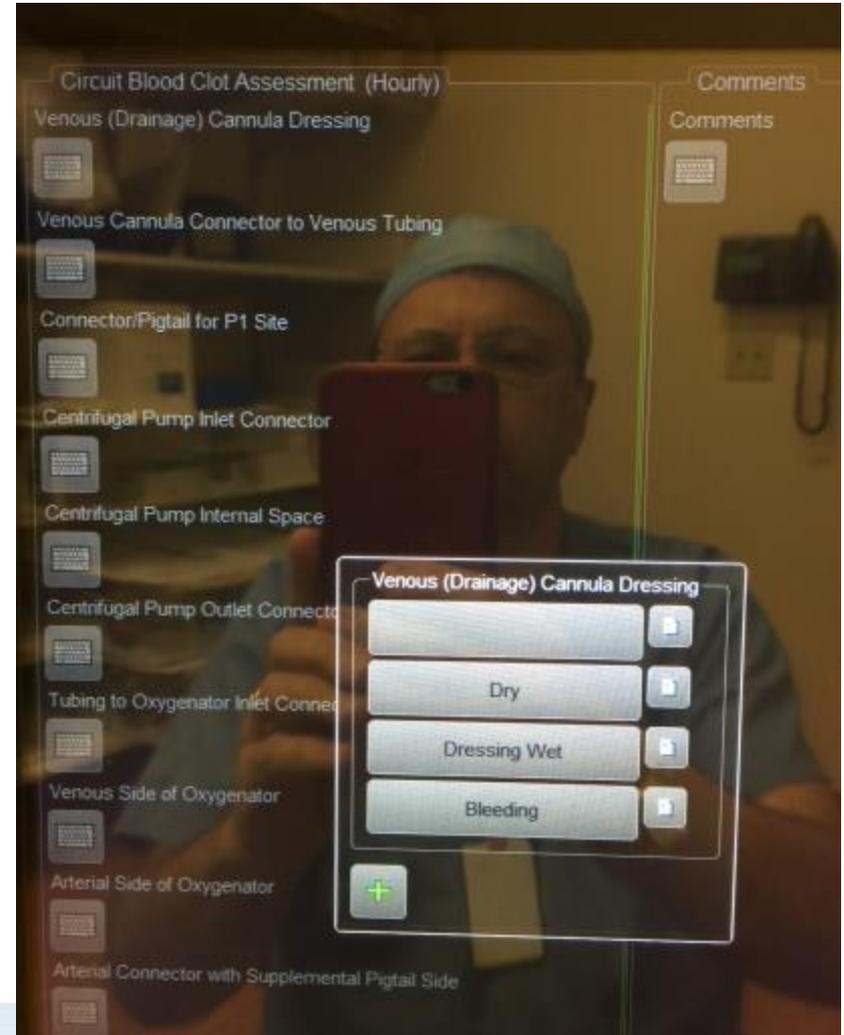
CIRCUIT CHECK ASSESSMENT



CHANGE OF SHIFT CHECKLIST



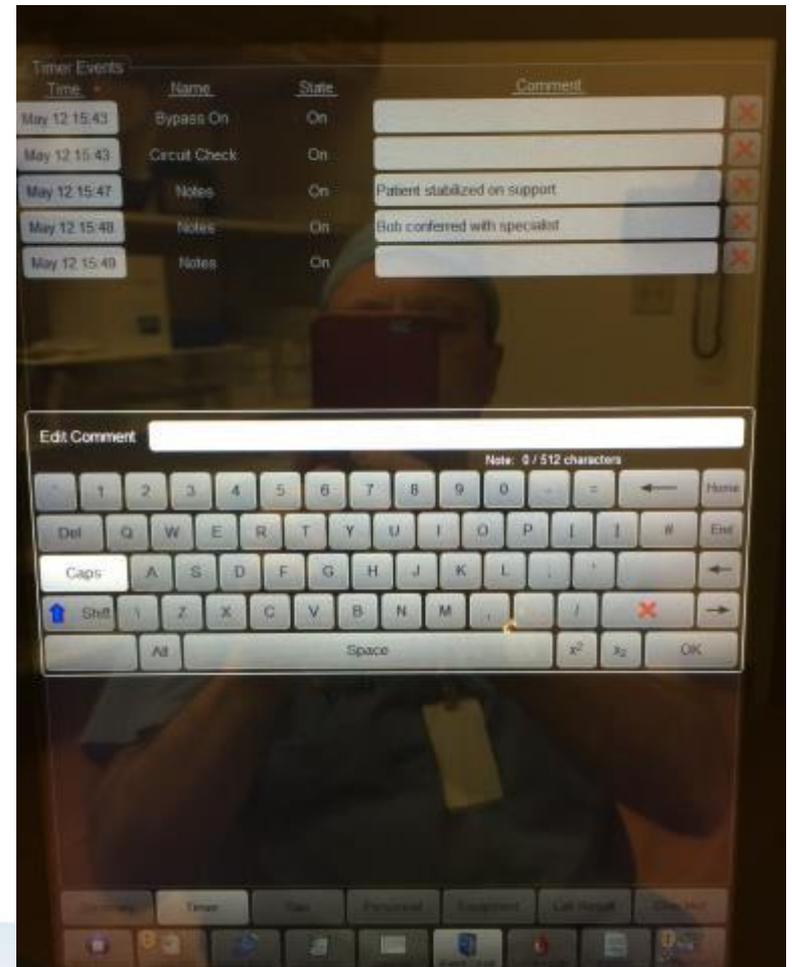
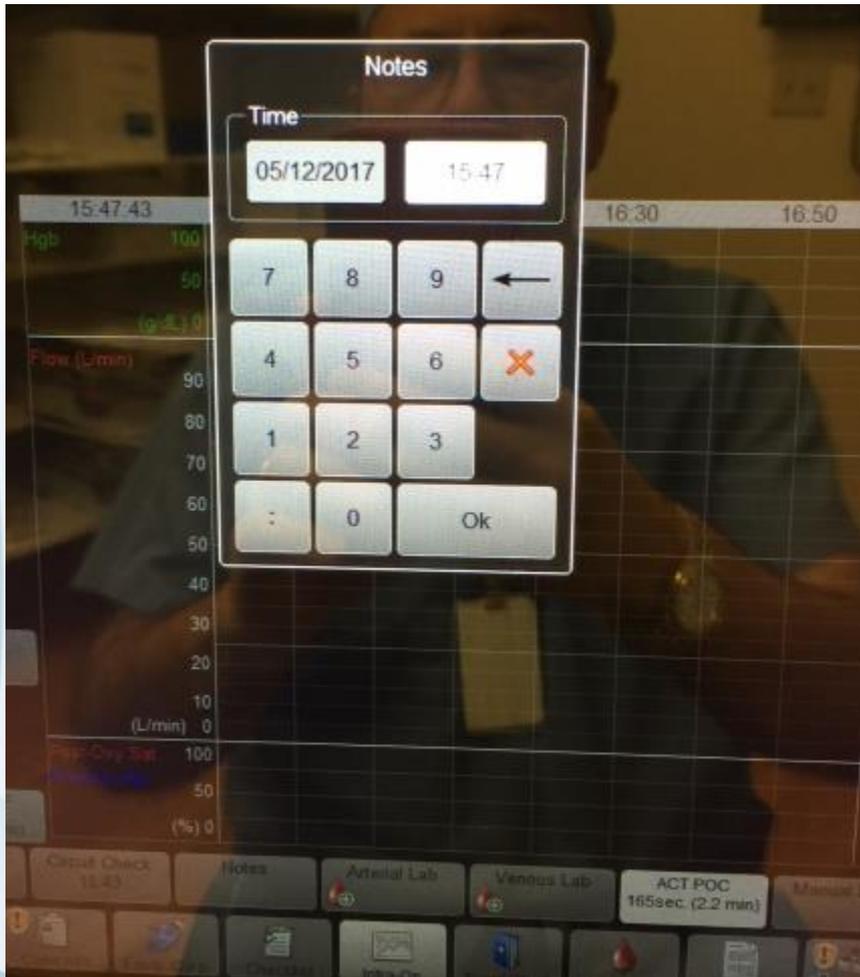
CIRCUIT CLOT ASSESSMENT



CHECKLIST SUMMARY SCREEN

- No Blood Clot Centrifugal Pump Internal Space - No Blood Clot Centrifugal Pump Outlet Connector - No Blood Clot Venous Side of Oxygenator - No Blood Clot Visible Arterial Side of Oxygenator - No Blood Clot Visible Arterial Connector with Supplemental Pigtail Side - No Blood Clot Arterial Tubing to Arterial Cannula Connector - No Blood Clot	
ECMO Pump Settings (Hourly) May 22 23:54	Comments
Pump RPM Setting (LPM) Pump Flow Setting (LPM) Sweep Gas Setting (LPM) FiO ₂ Setting (%) Pre-Oxygenator Saturation (%) Post-Oxygenator Saturation (%) Pre-Pump Pressure P1 (mmHg) Post-Oxygenator Pressure P2 (mmHg) Post-Oxygenator Pressure P3 (mmHg) Heater-Cooler Water Temp Setting (°C) Heater-Cooler Water Temp Actual (°C) Oxygenator Arterial Blood Temp (°C)	
Equipment & Circuit Assessment (Hourly) May 22 23:54	Comments
Circuit Plugged into a Red Outlet Pump Battery Charged/Charging Spare Pump Console and Drive Motor with Cart Tubing Clamps on Pump Oxygen Source and Line Checked Flashlight Available and Working Pump RPM/Flow Functional Pressure Transducers Checked/Functional	
Circuit Blood Clot Assessment (Hourly) May 22 23:55	Comments
Venous (Drainage) Cannula Dressing - Dry Venous Cannula Connector to Venous Tubing - No Blood Clot	
Summary	
Equipment & Circuit Assessment (Hourly)	
Transport Specifics & Performance and ECMO Overview	
Transport Arriving in Receiving Department	
ECMO Pump Settings (Hourly)	
Equipment & Circuit Assessment (Hourly)	
Circuit Blood Clot Assessment (Hourly)	
Checklist	

NOTE ENTRY



EVENT CHART SUMMARY SCREEN

Event Chart Summary

	Type	Name	Details
May 30 14:03	Checklist	Circuit Blood Clot Assessment (Hourly) May 30 14:03:21	
May 30 14:03	Checklist	Equipment & Circuit Assessment (Hourly) May 30 14:03:14	
May 30 14:03	Checklist	ECMO Pump Settings (Hourly) May 30 14:03:02	
May 30 14:02	Timer	Circuit Check	On
May 30 13:05	Checklist	Circuit Blood Clot Assessment (Hourly) May 30 13:05:00	
May 30 13:04	Checklist	Equipment & Circuit Assessment (Hourly) May 30 13:04:50	
May 30 13:04	Checklist	ECMO Pump Settings (Hourly) May 30 13:04:41	
May 30 13:04	Timer	Circuit Check	On
May 30 12:05	Checklist	Circuit Blood Clot Assessment (Hourly) May 30 12:04:43	
May 30 12:04	Checklist	Equipment & Circuit Assessment (Hourly) May 30 12:04:34	
May 30 12:04	Checklist	ECMO Pump Settings (Hourly) May 30 12:04:26	
May 30 12:04	Timer	Circuit Check	On
May 30 11:14	Checklist	Circuit Blood Clot Assessment (Hourly) May 30 11:13:27	
May 30 11:13	Checklist	Equipment & Circuit Assessment (Hourly) May 30 11:13:07	
May 30 11:13	Checklist	ECMO Pump Settings (Hourly) May 30 11:12:57	
May 30 11:12	Timer	Circuit Check	On
May 30 10:07	Checklist	Circuit Blood Clot Assessment (Hourly) May 30 10:06:13	

Summary Timer Gas Personnel Equipment Lab Result Best Practice

Checklist

Home Vital Signs Care Plan Lab Orders Checklist Alerts Event Chart Lab Results Patient Dashboard

CURRENT RESULTS & OPINIONS

- We've uncovered nagging network connectivity issues that have hopefully been corrected.
- Our M3 monitors are loaners until the latest Quantum workstation is available, then QDMU & M3 will be swapped for the latest iteration.
- I believe I can simplify the checklists we use (work in progress).
- There's a learning curve to navigating features in the Quantum.
- I really wish I could trend the RPMs of the CentriMag in addition to the flow.
- It's great to have critical data constantly trended and displayed.
- We do ACT testing via an HMS (same convention as in the CVOR, and results have to be manually entered into Spectrum and also in the lab's software.
- I've learned that the 2-way communication from Epic to the Quantum will be limited to the ADT feed. Virtually all info will go from Quantum to Epic.
- Electronic records for Perfusion (and especially for ECMO) are big files that require time to navigate, unlike our paper records. We're learning!

QUESTIONS?