System ECMO Collaborative: Breaking Down Silos Improves Patient Outcomes

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Background

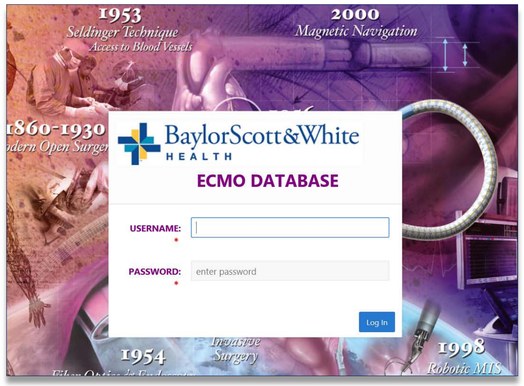
- Measuring and producing high quality outcomes are the focus of the current healthcare landscape.
- We examined operations, practices and quality outcomes of an extracorporeal membrane oxygenation (ECMO) program in a large healthcare system to surface and reduce clinical variation in 4 ECMO programs.

Methods

- ECMO data collection, data storage, existing treatment protocols, equipment, transfer and transport operations, ELSO outcomes, financial impact were extensively reviewed.
- Multidisciplinary team approach was utilized to address the key variables and to align 4 programs.

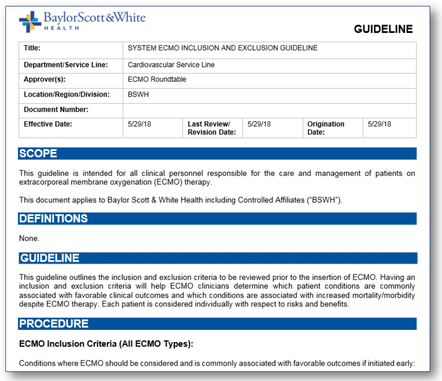
Example A -System Data Collection

An internal database, Apex, was developed for ECMO data collection and enhanced analytics.



Example B -Clinical Standardization: System ECMO Clinical Guidelines

To standardize clinical workflows and improve the care and management of ECMO patients and their outcomes, nine new system ECMO guidelines were developed and implemented.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GUIDELINE

Title:	SYSTEM ECMO INCLUSION AND EXCLUSION GUIDELINE				
Department/Service Line:	Cardiovascular Service Line				
Approver(s):	ECMO Roundtable				
Location/Region/Division:	BSWH				
Document Number:					
Effective Date:	5/29/18	**Last Review/ Revision Date:**	5/29/18	**Origination Date:**	5/29/18

SCOPE

This guideline is intended for all clinical personnel responsible for the care and management of patients on extracorporeal membrane oxygenation (ECMO) therapy.

This document applies to Baylor Scott & White Health including Controlled Affiliates ("BSWH").

DEFINITIONS

None.

GUIDELINE

This guideline outlines the inclusion and exclusion criteria to be reviewed prior to the insertion of ECMO. Having an inclusion and exclusion criteria will help ECMO clinicians determine which patient conditions are commonly associated with favorable clinical outcomes and which conditions are associated with increased mortality/morbidity despite ECMO therapy. Each patient is considered individually with respect to risks and benefits.

PROCEDURE

ECMO Inclusion Criteria (All ECMO Types):

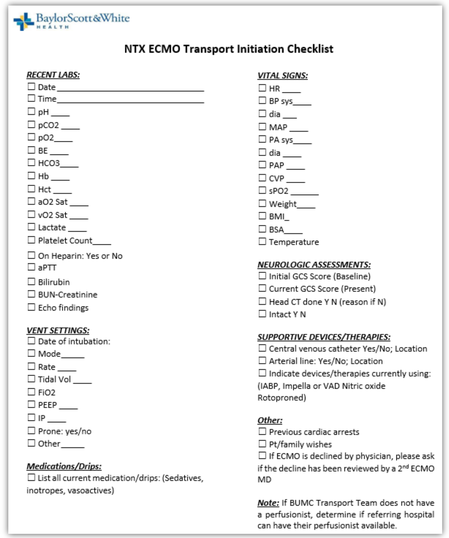
Conditions where ECMO should be considered and is commonly associated with favorable outcomes if initiated early:

These "best practice" ECMO guidelines include: ECMO inclusion and exclusion, insertion, management, weaning & de-cannulation, ECMO specialist competency, data & analytics, and credentialing, management & reappointment of CV surgeons, critical care physicians and cardiologists.

Example C -ECMO Transport Initiation Checklist

The development of this checklist:

1. helps capture pertinent medical history and assists with relaying critical clinical information required by the CV surgical team
2. ensures case is reviewed and approved by appropriate clinical staff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NTX ECMO Transport Initiation Checklist

RECENT LABS:
- ☐ Date_____
- ☐ Time_____
- ☐ pH ____
- ☐ pCO2 ____
- ☐ pO2____
- ☐ BE ____
- ☐ HCO3____
- ☐ Hb ____
- ☐ Hct ____
- ☐ aO2 Sat ____
- ☐ vO2 Sat ____
- ☐ Lactate ____
- ☐ Platelet Count____
- ☐ On Heparin: Yes or No
- ☐ aPTT
- ☐ Bilirubin
- ☐ BUN-Creatinine
- ☐ Echo findings

VENT SETTINGS:
- ☐ Date of intubation:
- ☐ Mode_____
- ☐ Rate ____
- ☐ Tidal Vol ____
- ☐ FiO2
- ☐ PEEP ____
- ☐ IP ____
- ☐ Prone: yes/no
- ☐ Other_____

Medications/Drips:
- ☐ List all current medication/drips: (Sedatives, inotropes, vasoactives)

VITAL SIGNS:
- ☐ HR ____
- ☐ BP sys____
- ☐ dia ____
- ☐ MAP ____
- ☐ PA sys____
- ☐ dia ____
- ☐ PAP ____
- ☐ CVP ____
- ☐ sPO2 _____
- ☐ Weight____
- ☐ BMI_
- ☐ BSA____
- ☐ Temperature

NEUROLOGIC ASSESSMENTS:
- ☐ Initial GCS Score (Baseline)
- ☐ Current GCS Score (Present)
- ☐ Head CT done Y N (reason if N)
- ☐ Intact Y N

SUPPORTIVE DEVICES/THERAPIES:
- ☐ Central venous catheter Yes/No; Location
- ☐ Arterial line: Yes/No; Location
- ☐ Indicate devices/therapies currently using: (IABP, Impella or VAD Nitric oxide Rotoproned)

Other:
- ☐ Previous cardiac arrests
- ☐ Pt/family wishes
- ☐ If ECMO is declined by physician, please ask if the decline has been reviewed by a 2nd ECMO MD

Note: If BUMC Transport Team does not have a perfusionist, determine if referring hospital can have their perfusionist available.

Cheryl Sepmoree, eCPR survivor patient, and her BUMC ECMO care team. Cheryl arrived to the ER in cardiac arrest during September of 2018 and speaks about her survival story frequently.

Results

Implementing standardized system ECMO guidelines, an internal database and transport process improvements resulted in positive trends in quality metrics: average days on ECMO and survival at discharge (9.3 days vs 7.0 days, p=0.37; 41% vs 51%, p=0.07). Volume metrics including total volume, VV ECMO, and ECPR increased, while VA ECMO and transport volume requiring cannulation on-site decreased.

Outcomes

	Year 2017	Year 2018	Difference	P-value
Quality Metrics				
Average ICU LOS (days)*	18.55	18.70	0.15	0.440
Average days on ECMO	9.3	7.0	-2.3	0.374
ECMO Survival at Discharge	41%	51%	+10%	0.0703
Volume Metrics				
Total Volume*	170	179	9	
VV	82	86	4	
VA	72	61	-11	
ECPR	16	32	16	
ECMO Transport Volume	53	45	-8	

*Complete data from three centers, partial from 4th center

Conclusions

This large-scale system quality improvement project provided valuable insights into building a foundation for introducing change and mobilizing alignment. This approach enabled system consensus on guidelines, protocols, process improvements and enhanced teamwork. Positive trends in our ECMO quality outcomes illustrate that this template for leading healthcare transformation is a model worth replicating in other improvement initiatives.

Disclosures

The authors have nothing to disclose.

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