

Andrea Goode, MD

Baylor University Medical Center, Dallas, TX

### Introduction

Despite advances in resuscitation, outcomes in cardiac arrest patients still remains poor. There are large regional variations in survival to hospital discharge (3.4%–22.0%) and survival with neurologic recovery (0.8%–20.1%) that have been observed throughout the United States <sup>1</sup>

Recent studies have shown that utilization of VA ECMO during CPR has been associated with improved survival and neurologic outcome compared to conventional CPR in adult cardiac arrest patients.<sup>2</sup>

### Objectives

Our goal was to identify a population of BUMC Emergency Department patients in refractory cardiac arrest that would benefit from VA ECMO as a bridge to definitive therapy or recovery and track neurologic outcomes.

### Methods

This is a prospective registry study on cardiac arrest patients presenting to Baylor University Medical Center. An ECPR protocol was formulated with emergency medicine, general surgery, cardiothoracic surgery, and perfusionist participants. Upon presentation of an ED patient in cardiac arrest, pre-determined inclusion and exclusion criteria are confirmed. The protocol is then activated and the ECMO team is mobilized to the ED. Data has been collected from the first cardiac arrest patient to undergo ECPR since initiation of the protocol (June 8, 2018) until present. Neurologic recovery is measured using Cerebral Performance Category scoring.

### STEMI ECPR PATIENTS

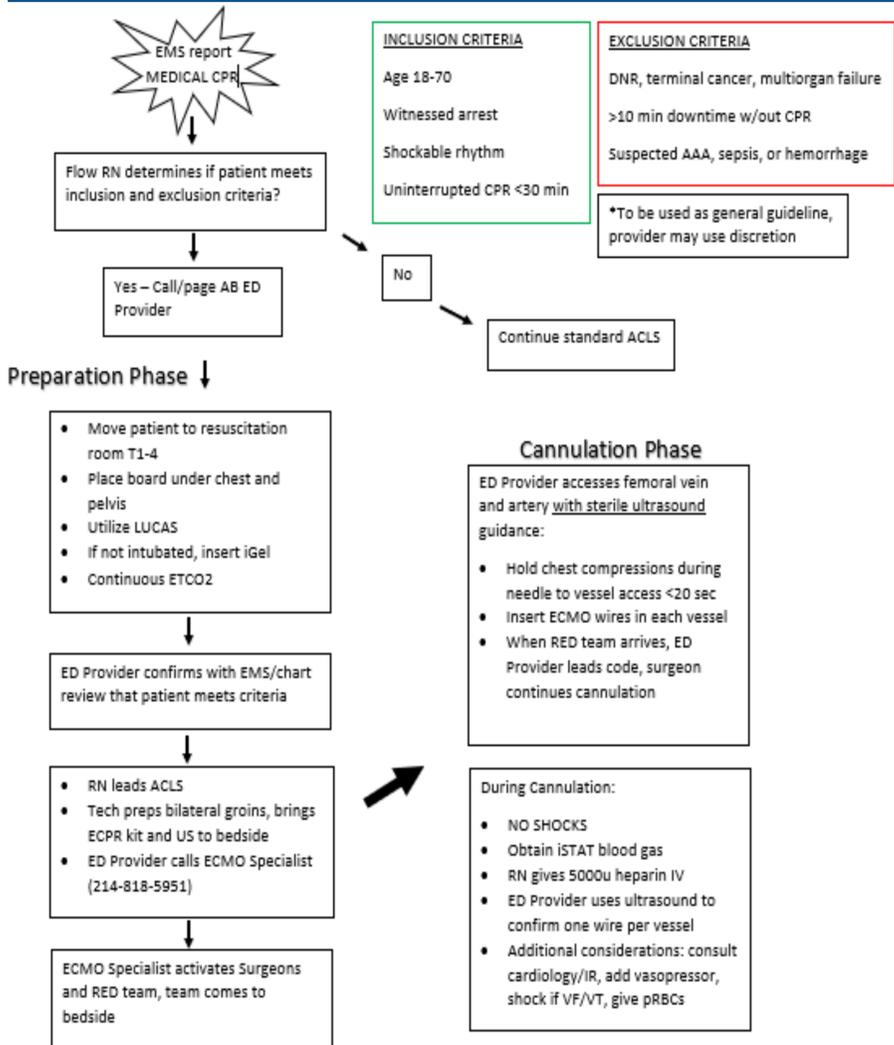
Age/gender	Initial rhythm	Initial pH	Arrest to ECMO	Arrest to PCI	EF at dc	CPC at dc
63 M	VF	7.17	43 min	3 hrs	35%	1
60 F	VF	7.33	44 min	4 hrs	40-45%	1
61 M	VF	7.27	74 min	1 day	30%	3, schizophrenia
65 F	VF	6.95	46 min	n/a	n/a	expired
63 M	VF	6.78	44 min	5 days	Active inpt	follows commands

\*sample of data set collected

### Results

Of the cardiac arrest patients that presented to BUMC during the study period, ten patients met ECPR criteria and were placed on ECMO. Average ED CPR time until ECMO initiation was 62.1 minutes. Initial rhythms included V fib, PEA, and asystole. Etiology of arrest included STEMI, hypothermia, HOCM, refractory VF, and myocarditis. 4/5 patients identified with STEMI went to the cath lab and underwent PCI. 2/10 patients presented in asystole and did not survive. 8/10 patients presented in VF and 6/10 patients survived to hospital discharge. All 6 survivors returned to CPC 1 or their baseline neurologic functional status.

### ECPR Protocol



### OTHER ECPR PATIENTS

Age/gender	Etiology of arrest	Initial rhythm	Initial pH	Arrest to ECMO	EF at dc	CPC at dc
16M	HOCM	asystole	7.02	75 min	n/a	expired
33 M	myocarditis	VF	7.36	60 min	60%	1
53 M	ICM/VF	VF	7.08	59 min	45%	1
50 F	Hypothermia	VF	6.98	75 min	65%	3, dementia
69 F	Hypothermia	asystole	6.6	101	n/a	expired

\*sample of data set collected

### Discussion and Goals

Since the initiation of this protocol in the BUMC ED in June 2018, we have had ten ECPR patients. Six of these patients have had significant cardiac recovery and are back to their baseline neurologic status as well. Factors that show favorable prognosis include VF as presenting rhythm, early initiation of ECMO. Factors that show poor prognosis include asystole, acidosis. Overall, ECPR is showing advantageous outcomes at BUMC in comparison to general cardiac arrest outcomes data.

Our goals have been to determine early in the ED course which patient populations benefit from this advanced resuscitation technology and to perform cannulation in a safe and timely manner during cardiac arrest. We are working to utilize VA ECMO appropriately in candidates with suspected reversible pathology as a bridge to definitive therapy or recovery, including early PCI if indicated. We have consistent debriefings after ECPR cases and education to providers and staff each month regarding protocol updates. We will continue to gather data from these cases in order to confirm appropriate selection criteria and streamline this process. Our goals in the near future are to provide EMS education and apply our ECPR screening process to the prehospital cardiac arrest population in effort to identify those that meet inclusion criteria even earlier and prepare for their arrival to the ED. We will also be providing cannulation training and experience for our ED physicians through wet lab simulation.

### Conclusions

Utilization of ECMO in a select population of BUMC Emergency Department cardiac arrest patients has shown to have favorable neurologic outcomes..

### Contact

Andrea Goode, MD  
Integrative Emergency Services  
Baylor University Medical Center  
Andrea.goode@bswhealth.org

### References

- Benjamin, E. *et al.* Heart Disease and Stroke Statistics—2018 Update: A Report From the American Heart Association." *Circulation*, 137(12), p. e493
- Ahn, C. *et al.* Efficacy of extracorporeal cardiopulmonary resuscitation compared to conventional cardiopulmonary resuscitation for adult cardiac arrest patients: a systematic review and meta-analysis. *Sci. Rep.* 6, 34208; doi: 10.1038/srep34208 (2016)