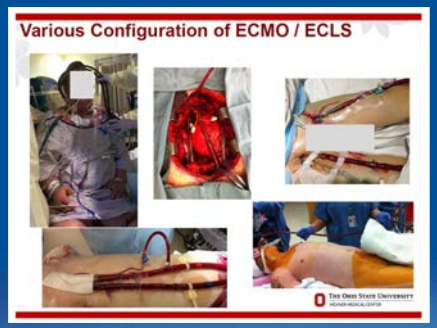
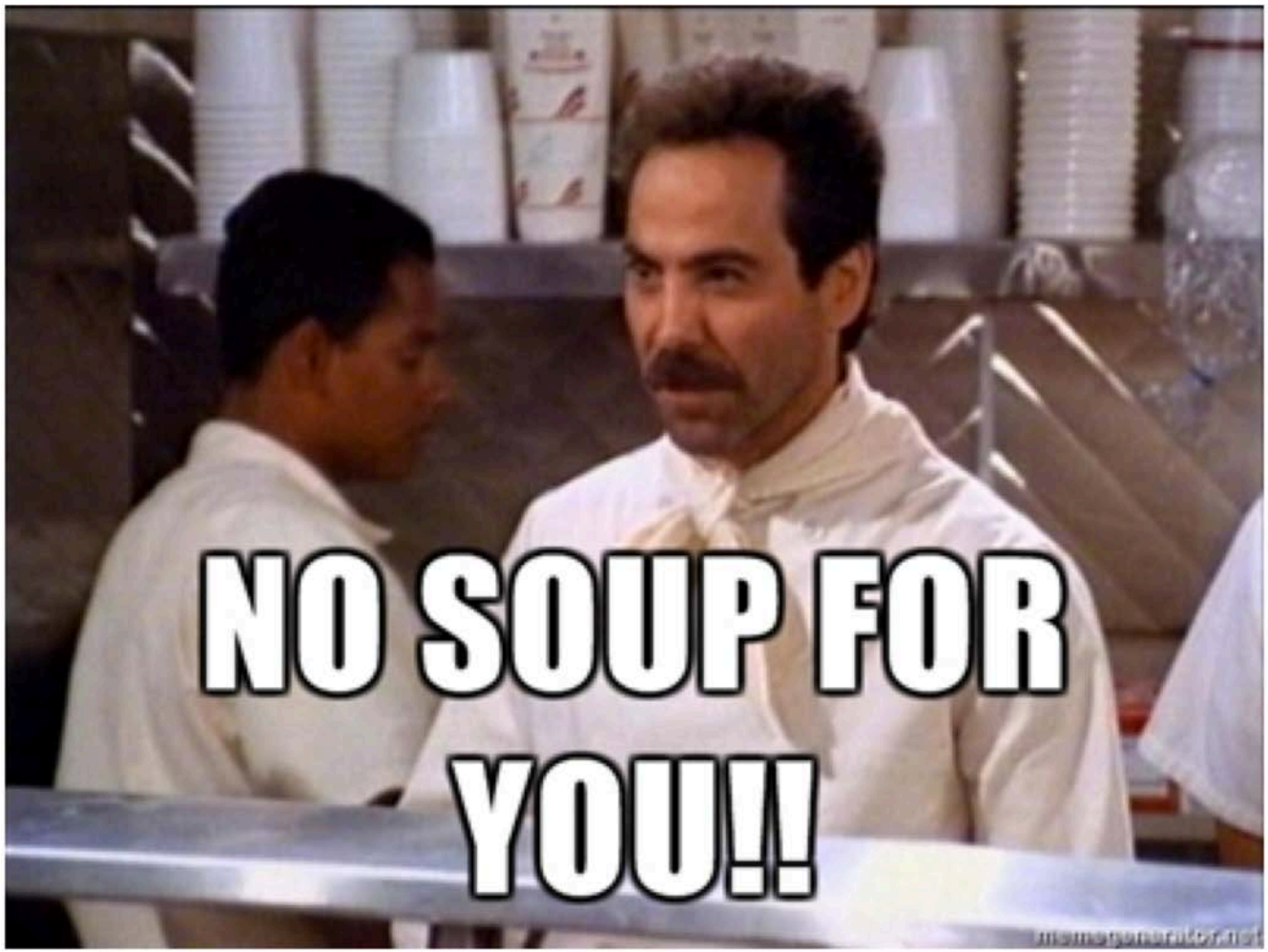
Extra-Corporeal Activities:

Technology, Mobility and a Tale of 4 Cities



THE CITY OF COLUMBUS
ANDREW J. GINTHER, MAYOR
DIVISION OF FIRE

David P. Keseg, MD FACEP
Medical Director, Columbus Division of Fire
Adjunct Professor, The Ohio State University


NO SOUP FOR YOU!!


ORIGINAL RESEARCH

Minnesota Resuscitation Consortium's Advanced Perfusion and Reperfusion Cardiac Life Support Strategy for Out-of-Hospital Refractory Ventricular Fibrillation

University of Minnesota
Driven to Discover

ECMO in Out of Hospital Cardiac Arrest (OHCA)

Protocol Changes

Original Protocol – 8/15/17

Inclusion Criteria
- ❑ 18 – 65 y/o
- ❑ Witnessed arrest
- ❑ Bystander CPR

Exclusion Criteria
- ❑ DNR

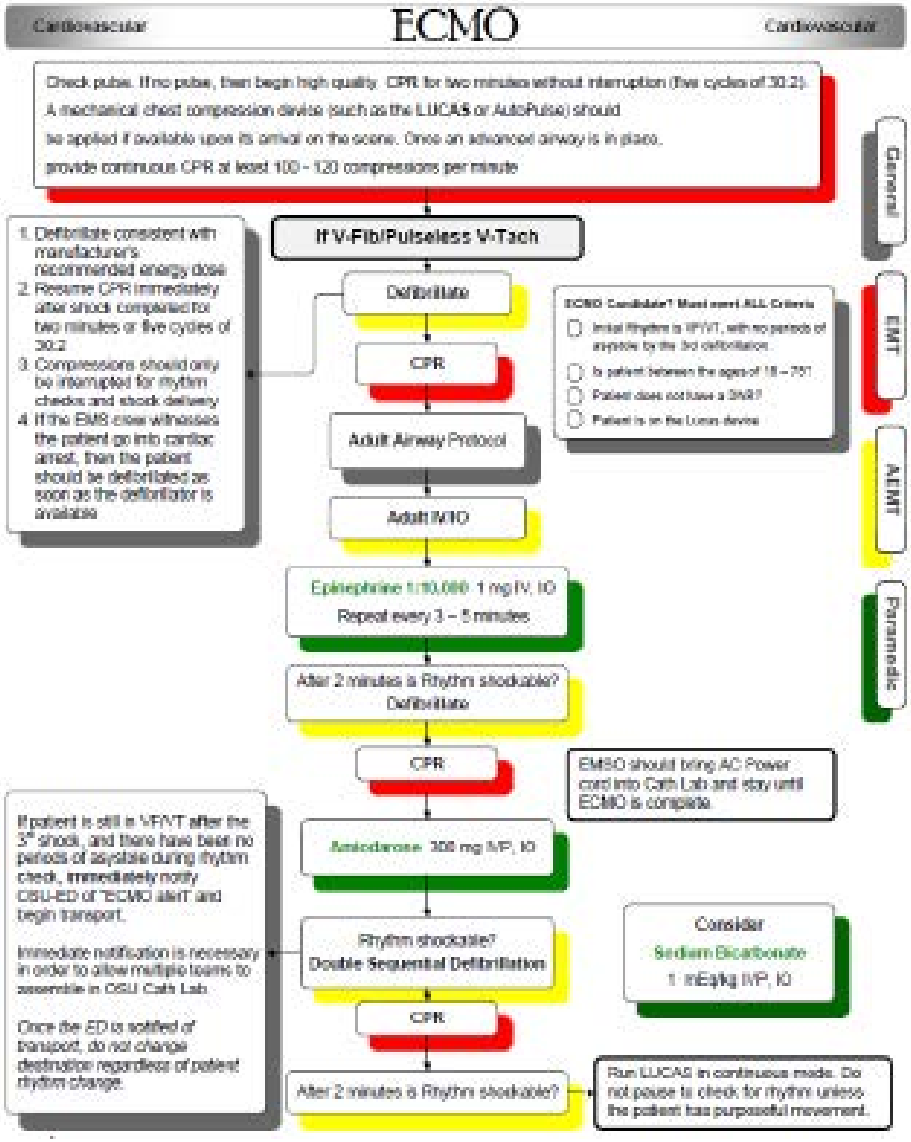
Cath Lab Pre-procedure Checklist
- ❑ BMI < 42 (best estimate)
- ❑ Lactate < 12 mg/dl
- ❑ ETCO2 > 10
- ❑ PaO2> 50 mmHg
- ❑ Adequate peripheral access
- ❑ Willing to take blood products

Current Protocol as of 10/15/18

Inclusion Criteria
- ❑ 18 – 75 y/o
- ❑ May be **unwitnessed** arrest
- ❑ May be **without** bystander CPR

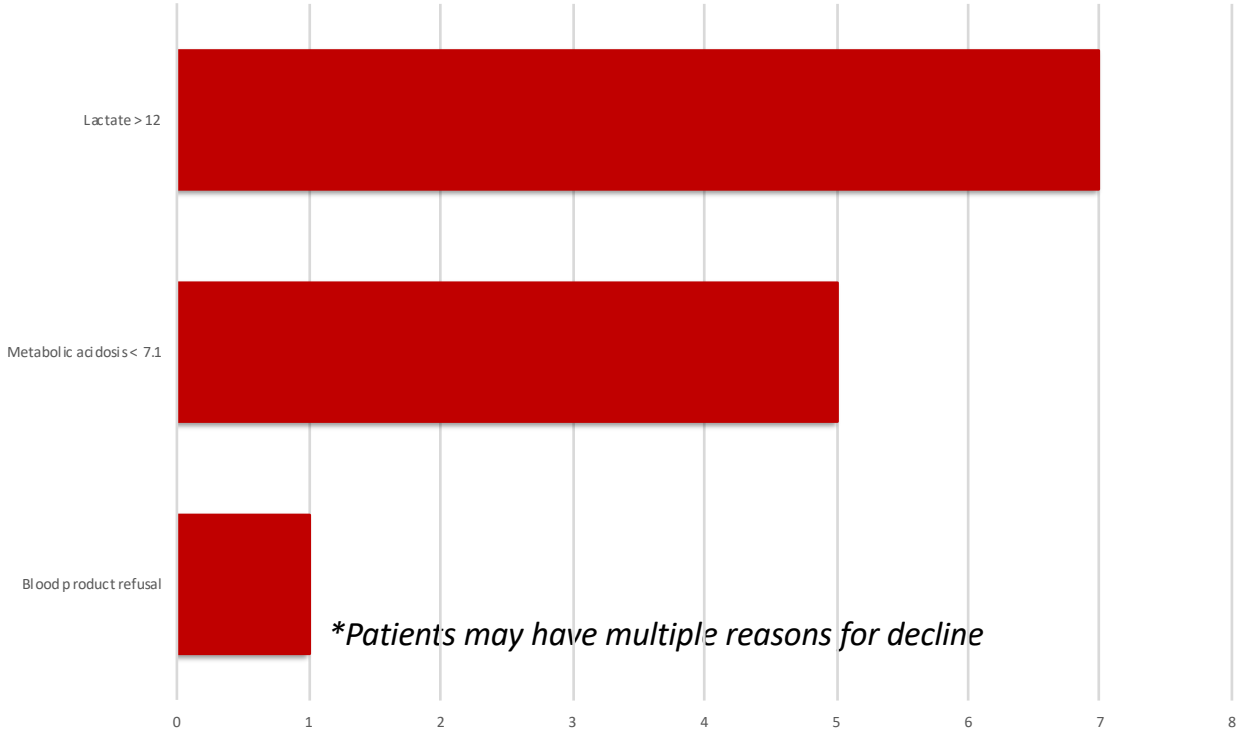
Exclusion Criteria
- ❑ DNR
- ❑ **Asystole at any time**
- ❑ **Lucas device must fit the patient**
- ❑ **PEA upon arrival**

Cath Lab Pre-procedure Checklist
- ❑ Lactate < **15 mg/dl**


Cardiovascular
ECMO
Cardiovascular
Check pulse. If no pulse, then begin high quality CPR for two minutes without interruption (five cycles of 30:2).
A mechanical chest compression device (such as the LUCAS or AutoPulse) should
be applied if available upon its arrival on the scene. Once an advanced airway is in place,
provide continuous CPR at least 100 - 120 compressions per minute
General
1. Defibrillate consistent with manufacturer's recommended energy dose
2. Resume CPR immediately after shock completed for two minutes or five cycles of 30:2
3. Compressions should only be interrupted for rhythm checks and shock delivery
4. If the EMS crew witnesses the patient go into cardiac arrest, then the patient should be defibrillated as soon as the defibrillator is available
If V-Fib/Pulseless V-Tach
Defibrillate
CPR
Adult Airway Protocol
Adult IV/IO
ECMO Candidate? Must meet ALL Criteria
Initial Rhythm is VF/VT, with no periods of asystole by the 3rd defibrillation
Is patient between the ages of 18 – 75?
Patient does not have a DNR?
Patient is on the Lucas device
EMT
AEMT
Epinephrine 1:10,000 1 mg IV, IO
Repeat every 3 – 5 minutes
After 2 minutes is Rhythm shockable?
Defibrillate
Paramedic
CPR
EMSO should bring AC Power cord into Cath Lab and stay until ECMO is complete
If patient is still a VF/VT after the 3rd shock, and there have been no periods of asystole during rhythm check, immediately notify OSU-ED of "ECMO alert" and begin transport.
Immediate notification is necessary in order to allow multiple teams to assemble in OSU Cath Lab
Once the ED is notified of transport, do not change destination regardless of patient rhythm change.
Amiodarone 300 mg IVP, IO
Rhythm shockable?
Double Sequential Defibrillation
Consider
Sodium Bicarbonate
1 mEq/kg IVP, IO
CPR
After 2 minutes is Rhythm shockable?
Run LUCAS in continuous mode. Do not pause to check for rhythm unless the patient has purposeful movement.

Cath Lab Decision to Decline*

13 out of 14 ECPR Activations arrived to the cath lab
8 of the 13 were declined
5 had ECMO initiated



**Patients may have multiple reasons for decline*

ECPR Volume	5
Neurologic Complications	1
Infection Complications	0
Cardiopulmonary Complications	0
Renal Complications	1
Limb Complications	0
Mechanical Problems	0
Hemorrhagic Complications	1
Metabolic Complications	4

Neurologic Complications	8/2017 - Current
Volume	1
EEG Seizures	1

Renal Complications	8/2017 - Current
Volume	1
CAVHD	1

Hemorrhagic Complications	8/2017 - Current
Volume	1
Cannula Site Bleeding	1

Metabolic Complications	8/2017 - Current
Volume	4
Hyperbilirubinemia	1
Glucose > 240	4
pH > 7.60	1

*Patients can have multiple metabolic

EMS Dispatch to Cannulation (mins) n=5

Median	77
Average	78

EMS Arrival at Patient to Cannulation (mins) n=5

Median	69
Average	72

EMS Dispatch to ROSC (mins) n=6

Median	78
Average	72

EMS Depart Scene to Patient in Cath Lab (mins) n=12

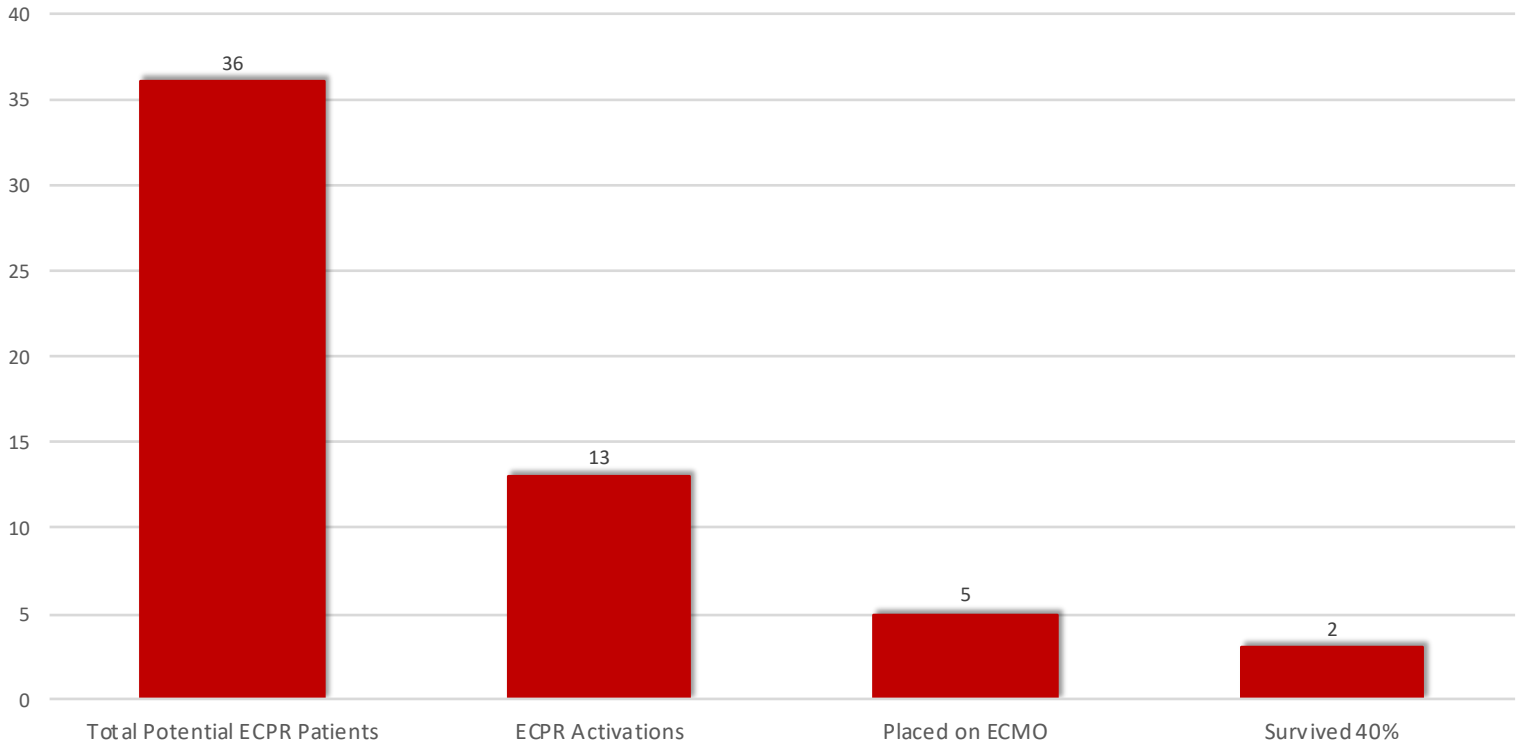
Median	23
Average	24

REFRACTORY V-FIB CASES: COLUMBUS DIVISION OF FIRE				
DATE	ECPR activation	ECMO	D/C Alive	REASON FOR EXCLUSION
8/21/2017	No			Unwitnessed arrest, no bystander CPR
8/21/2017	No			Unwitnessed arrest
8/25/2017	No			Unwitnessed arrest, no bystander CPR
8/28/2017	No			Witnessed arrest, no CPR (brought to firehouse by family)
9/3/2017	No			No bystander CPR, too large for Lucas Device
9/5/2017	No			Converted on 3rd defibrillation
9/8/2017	No			Witnessed arrest, no bystander CPR
9/15/2017	**YES**	**YES**	**YES**	**Witnessed arrest, bystander CPR - ECLS**
9/22/2017	**YES**	**No**		**Metabolic derangements**
9/23/2017	**YES**	**No**		**Lactate 19**
10/2/2017	**YES**	**YES**	**No**	**Deceased HD, anoxic brain injury, HD#5**
10/6/2017	**YES**	**No**	**YES**	**ROSC in cath lab**
10/24/2017	No			Unwitnessed arrest, no bystander CPR
10/30/2017	No			No bystander CPR
11/2/2017	No			No bystander CPR
11/22/2017	No			Age 67
11/27/2017	No			Arrest in Medic, no Lucas Devise available
12/11/2017	**YES**	**YES**	**YES**	**52 y/o, anterior STEMI, ostial LAD stent**
12/21/2017	No			93 y/o
1/6/2018	No			Communication error
1/27/2018	No			Unwitnessed arrest
1/29/2018	No			Unwitnessed arrest
2/4/2018	No			No bystander CPR
2/6/2018	No			Rhythm change to PEA on 3rd defibrillation
3/1/2018: PROTOCOL CHANGE				
3/1/2018	No			EMS unable to secure airway
3/5/2018	**YES**	**No**		**49 y/o did not meet criteria, elevated lactate, low ETCO2**
3/12/2018	**YES**	**No**		**Elevated lactate**
4/13/2018	No			Too large for Lucas Device
4/15/2018	**YES**	**YES**	**No**	**Expired in cath lab**
4/16/2018	**YES**	**YES**	**No**	**43 y/o Failed to regain any neurologic function**
5/1/2018	**YES**	**No**	**No**	**39 y/o witnessed arrest. Unknown start of CPR, elevated lactate**
5/3/2018	**YES**	**No**	**No**	**Lactate 16, expired in cath lab**
5/10/2018	No			ROSC, STEMI, transported to closer facility
6/2/2018	**YES**	**No**		**Rhythm converted to PEA, placed in ED Trauma Bay, expired**
6/12/2018	No			Did not meet prehospital criteria, transported to closer facility
6/24/2018	No			Did not meet prehospital criteria, transported to closer facility

LEVEL ONE ECPR PATIENT LIST

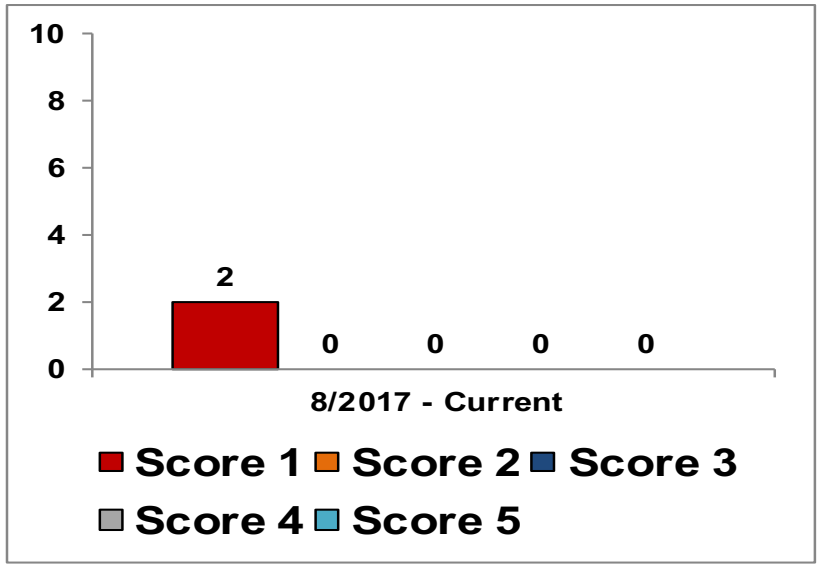
DATE	AGE	SEX	CFD STA.	CRITERIA MET	ALERT PAGED	DECLINED	DISPOSITION	1st LACTATE	1st PaO2	1st ETCO2
2017										
9/15/2017	**68**	**m**	**12**	**y**	**n**	**n**	**survived**	**7.8**	**100**	**34**
9/23/2017	53	f	5	n	n	y	expired	10.39	121.7	PCO2=35
10/2/2017	**48**	**m**	**Madison**	**n**	**n**	**n**	**expired**	**10**	**PO2=58**	**PCO2=86**
10/2/2017	63	m	806	n	n	y	expired	19		0
10/6/2017	44	m	8	y	n	y	expired	12.5	PO2=284	PCO2=72
12/11/2017	**52**	**m**	**17**	**y**	**n**	**n**	**survived**	**11**	**PO2=52**	**PCO2=63**
2018										
1/8/2018	71	m	6	n	y	y	expired	15		
3/12/2018	49	m	49	y	n	y	expired			
4/15/2018	**54**	**m**	**815**	**y**	**y**	**n**	**expired**	**12**	**PO2=84**	**PCO2=47**
4/16/2018	**43**	**m**	**4**	**y**	**y**	**n**	**expired**	**13.5**	**PO2=151**	**PCO2=60**
5/1/2018	39	m	7	y	y	y	expired	**>20**	**PO2<50**	
5/3/2018	50	m	21	y	y	y	expired	15		
5/18/2018	54	m	815	n	y	y	expired	15.32	PO2=83.1	PCO2=92.1
6/2/2018	43	m	31	n	y	y	expired	13.94	PO2=45.1	PCO2=105

OSU | CFD ECPR Populations: FY18

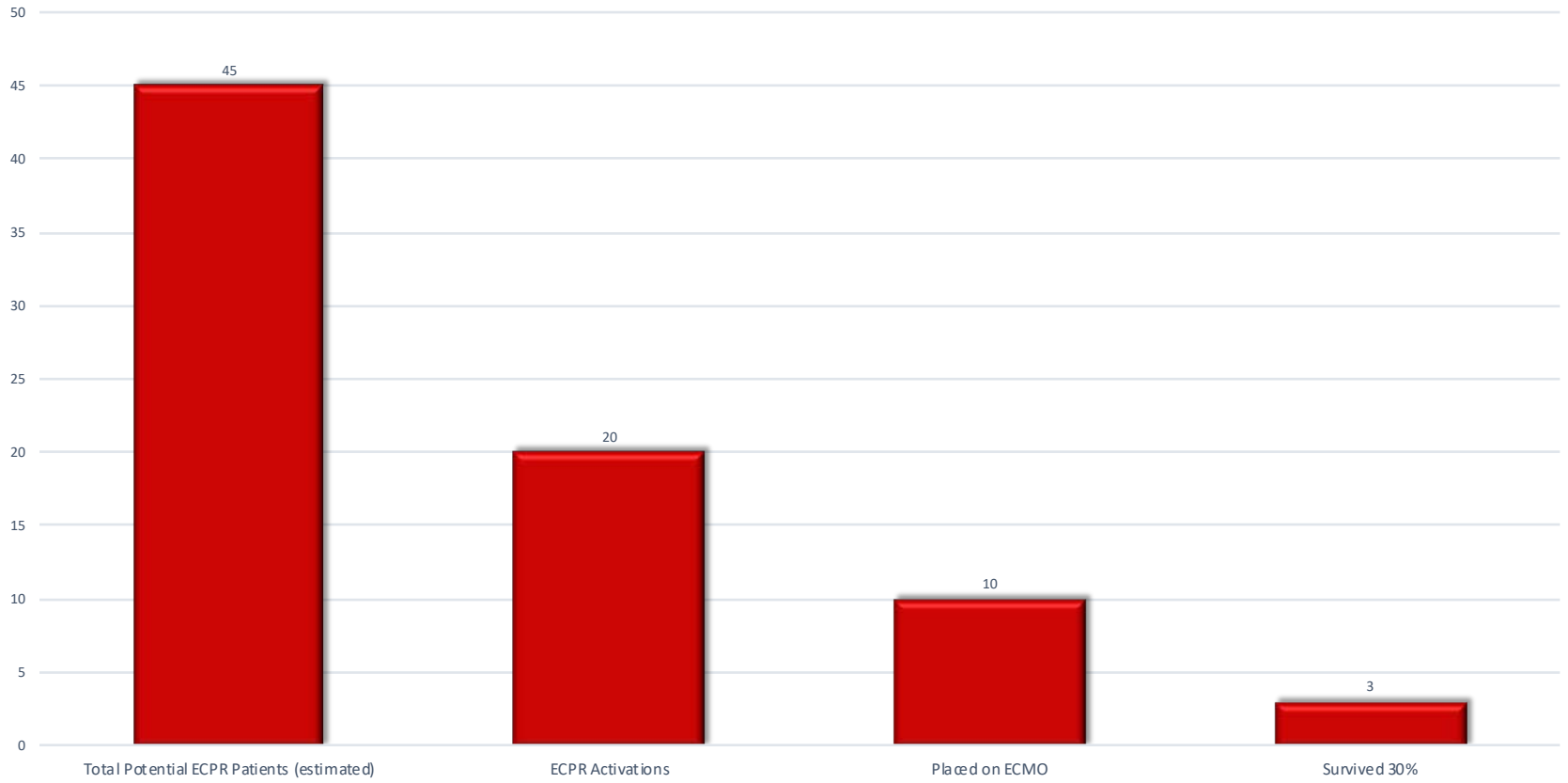


- **CPC 1. Good cerebral performance: conscious, alert, able to work, might have mild neurologic or psychologic deficit**
- **CPC 2. Moderate cerebral disability: conscious, sufficient cerebral function for independent activities of daily life. Able to work in sheltered environment.**
- **CPC 3. Severe cerebral disability: conscious, dependent on others for daily support because of impaired brain function. Ranges from ambulatory state to severe dementia or paralysis.**
- **CPC 4. Coma or vegetative state: any degree of coma without the presence of all brain death criteria. Unawareness, even if appears awake (vegetative state) without interaction with environment; may have spontaneous eye opening and sleep/awake cycles. Cerebral unresponsiveness.**
- **CPC 5. Brain death: apnea, areflexia, EEG silence, etc.**

CPC Score: All Survivors	8/2017 - Current
Score 1	2
Score 2	0
Score 3	0
Score 4	0
Score 5	0



OSU | CFD ECPR Populations: FY19 to date



TALKING POINTS

- EMS MORALE
- HOSPITAL AWARENESS
- BLOOD PRODUCTS
- SMALL PATIENT POPULATION
- OTHER HOSPITALS DON’T HAVE BAND WIDTH

QUESTIONS??????

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