UW EMERGENCY DEPT ECMO / ECPR WORKFLOW

1. PATIENT MEETS ALL INCLUSION CRITERIA?

- Age 13-70 years; weight ≥40kg
- Initial VT/VF *OR* witnessed arrest of any rhythm *OR* intermittent ROSC
- Suspect reversible cause of arrest
  - STEMI, massive PE, cardiac toxin overdose, primary arrhythmia, accidental hypothermia, etc
- ECPR can be initiated within ~60 min of estimated time of initial arrest

Yes / No

2. PATIENT HAS NO KNOWN EXCLUSION CRITERIA?

- Contraindication to anticoagulation
- Estimated BMI >40
- Significant/life limiting comorbidities
  - Severe neuro-cognitive impairment
  - Severe COPD, vent-dependent, etc
  - ESRD and/or hemodialysis
  - Cirrhosis and/or ESLD
  - Metastatic malignancy
- ECPR not consistent with goals of care/DNR
- Attending physician perception of futility

Yes / No

Do not proceed with ECMO/ECPR

Continue usual goal-directed resuscitation

3. OBTAIN RAPID ECMO CONSULT BY PHONE

ED Attending tells **EDC** & **CTL** *"I need an ECMO consult"*

EDC calls **Thoracic Surg Staff** cell and connects to **ED Attending** clinical cell

EDC remains on line (3-way call) & completes Epic "ECMO Consult" Navigator

4. DECISION TO PROCEED WITH ECMO ACTIVATION?

Yes / No

Thoracic Surg Staff explicitly states *"ok, we will activate ECMO"*

EDC selects "Yes" (Adult vs Peds) & closes Navigator

Page automatically generated & sent to appropriate ECPR group

EDC selects "No" in Navigator

EMS radio report
ED ECMO can/should be consulted prior to patient arrival if the patients meets criteria – get the details from prehospital!

The clock is ticking…
*Initiate ED ECMO consult within **10min or 3 cycles** of ACLS for candidate patients*

Peri-arrest consult
If a candidate patient has a downward trajectory despite maximal resuscitation, consider earlier ECMO consult to minimize arrest-to-pump time

Data points to convey
- Age & approx. weight
- Known comorbidities
- Downtime
- CPR quality
- Review inclusion & exclusion criteria

For definitive STEMI call UW Access Center ASAP to discuss with Interventional Cardiology (IC) [select 1] (Fax pre & post ECMO)

Note: *Some IC Staff will cannulate STEMI patients. ECMO consult & activation process should still be utilized to standardize & quickly mobilize resources*

Cancellation: *EDC sends "CANCEL ED ECMO ACTIVATION" to*
*Adult: **Pager #9797***
*Peds: **Pager #1047***

UWHealth

	Activation	Preparation	Time-out	Access	Cannulate	On-pump	Next steps
ED Attending	Detailed on page 1 algorithm	Ensure high-quality goal-directed CPR		Call for heparin bolus	CPR (no addt'l defib)	Discontinue CPR	See "Immediate additional ED diagnostics"
ED Senior Resident	Code leader	Verbal order to recording RN: "**ED-ECMO / ECPR**" (order set)		Consider additional access (IO vs CVL)	CPR (no addt'l defib)	Discontinue CPR	Place USN-guided R radial arterial line
Cannulating Attending	Proceed to bedside	"Pre-timeout" (review inclusion/exclusion criteria) if not already performed by phone; gown & glove	Perform time-out	Access groin	Femoral VA cannulation		"Immediate post-ECPR resuscitative goals"
Cannulating Assistant	Proceed to bedside	- Prep & drape groins - Open cannulation equipment onto sterile field (patient right)	Gown & glove	Sterile USN probe to cannulating MD	Femoral VA cannulation	Secure & dress cannulae	"Immediate additional ED therapeutic considerations"
ED Tech 1	- Place LUCAS device - Ensure IV/IO access	**Ultrasound** to bedside (patient left) – plug in; turn on; select linear probe		Monitor LUCAS placement		Discontinue compressions when directed by Attending	Obtain EKG
ED Tech 2/3	Cannulation cart & ECMO circuit to bedside	Remove unnecessary large equipment from resus bay		Ensure LUCAS plugged in	Additional PIV access prn		Prepare to transport to CT
ED Primary RN	ACLS in conjunction w/ ED team	- Ensure labs sent - Titrate epi infusion to goal DBP ≥35		Prepare arterial line setup			Prepare to transport
ED Recording RN	Document resus & cannulation time-stamps	- Enter "ECPR order set" order per MD - Hats & masks for all team members			Crowd control prn		
ED CTL	Consider paging SOS	Notify Nursing Supervisor re ICU bed need (B4/5 for adult, PICU for peds)		Notify Northside ED Attending			
RPh	- ACLS meds - Prepare epinephrine infusion	Prepare **heparin** bolus				PAD protocol meds prn	"Immediate additional ED therapeutics"
Perfusionist		Proceed to bedside; circuit to resus bay		Circuit prime & prep		Announce when 3L/min flow reached	Debrief w/ Cannulating MD
RT	Secure ETT	Avoid overventilation				Ventilator to ECMO "rest settings"	Prepare to transport

Immediate post-ECPR resuscitative goals

-↑ ECMO flow to 3L/min then discontinue mechanical compressions
-Bolus albumin as needed – **goal flow CI≥2 L/min/m²**
-Titrate epinephrine +/- additional pressors – **goal MAP ≥65 mmHg**
-Targeted temperature management (TTM) via ECMO bath – **goal temp 36 °C**

*****Place ECMO Order Set: "ED-ECMO / ECPR" (if not already done so)*****

	ALL PATIENTS	CONSIDER ALSO
Immediate additional ED DIAGNOSTICS	-**12-lead ECG** • STEMI activation for usual criteria -**Bedside POC cardiac ultrasound** • Determine initial cardiac function -**CT head (non-con)** • Grey-to-white ratio to inform neuroprognosis -**CT chest/abdomen/pelvis (non-con)** • R/o compression-related hemorrhage sources	-**CTA chest** • Page "Pulmonary Embolism (PERT) 1st Call" as indicated -**Bedside "RUSH" exam** • Echo + FAST + lung USN -**Toxicology workup**
Immediate additional ED THERAPEUTICS	-**Analgesia & Sedation** • UW Pain, Agitation, & Delirium (PAD) order set -**Ventilator "Rest Settings"** • FiO2 30% | PEEP 10 | Vt 4-6mL/kg IBW | RR 10 -**Cath Lab** • Emergent PCI for all STEMI patients • Also strongly consider for any adult patient without an apparent non-cardiac etiology	-**Medications** • Antiplatelet agents for AMI • Heparin gtt for VA ECMO • NMB to protect cannulae • Specific antidotes -**Interventions** • Catheter-directed thrombolysis for PE
CONSULTATIONS	-**Interventional Cardiology Fellow** to evaluate need for Cath Lab (see above) -**Anesthesia** will accompany any ECPR patient going to Cath Lab (Cards fellow to call)	-**Trauma** if suspicion for precipitating or 2° injury

DISPOSITION

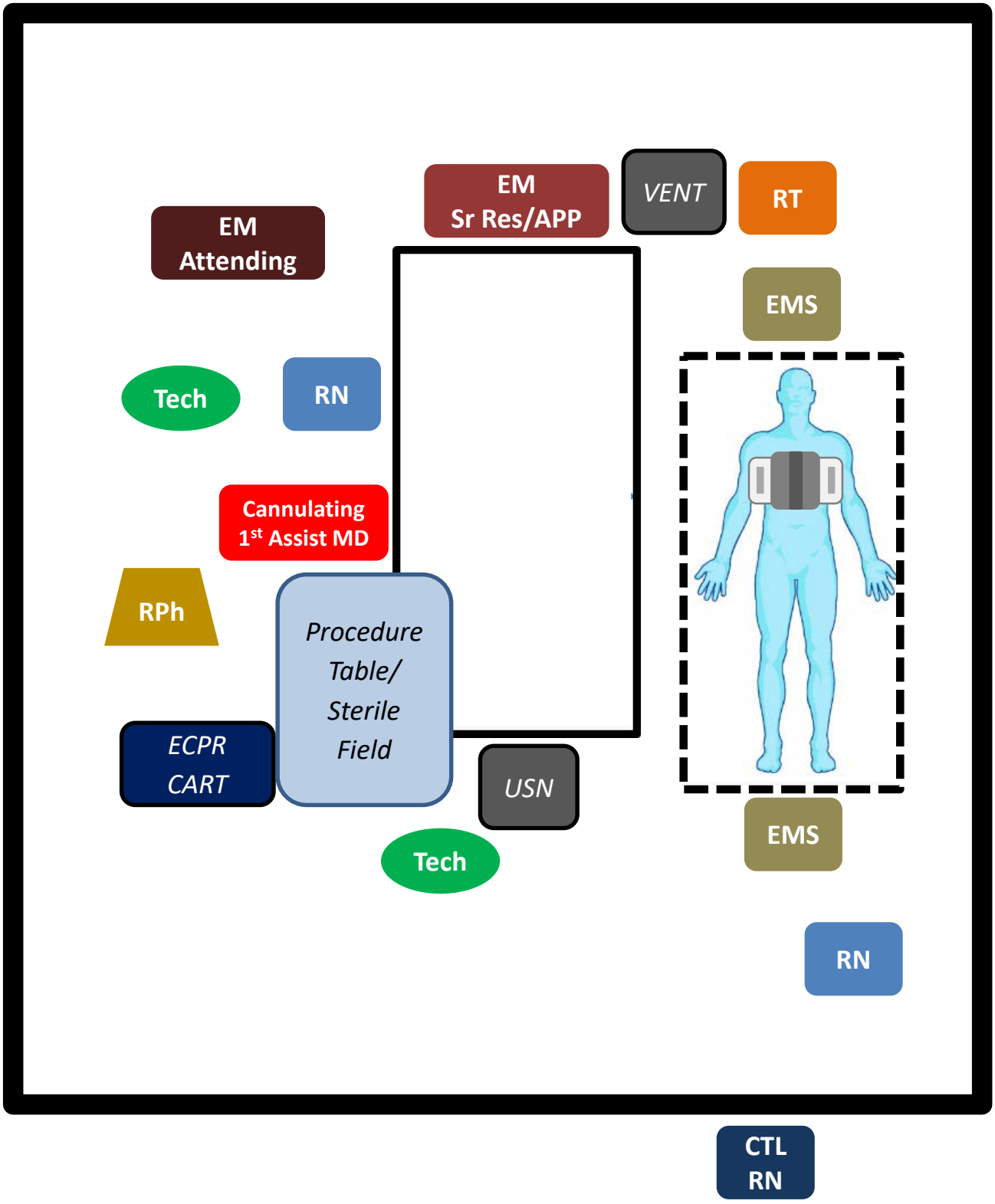
-All ECPR patients require an accepting Critical Care service
-*Adult*: Page **Cardiothoracic ICU Attending** for provider-provider handoff
Admitting unit/service: **B4/5**; **Cardiothoracic Critical Care**
-*Peds:* PICU will respond to bedside in ED for provider-provider handoff
Admitting unit/service: **PICU**; **PICU**

ICU CARE

-Consider "***IP – Targeted Temperature Management***" order set for best-practice post-cardiac arrest care
-See UW Health UConnect guideline: "***Extracorporeal Membrane Oxygenation (ECMO): Initiation and Management***"
-ECMO Consult Team (Thoracic Surgery, ECMO Coordinator, Perfusionist) is responsible for ECMO circuit management, weaning, & decannulation

PROGNOSIS

-Except in cases of obvious devastating anoxic brain injury on initial CT, do not withdraw care before standard neuroprognostication complete
-Candidacy for organ donation should be considered as appropriate


EM Attending
EM Sr Res/APP
VENT
RT
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RN
Cannulating 1st Assist MD
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Procedure Table/ Sterile Field
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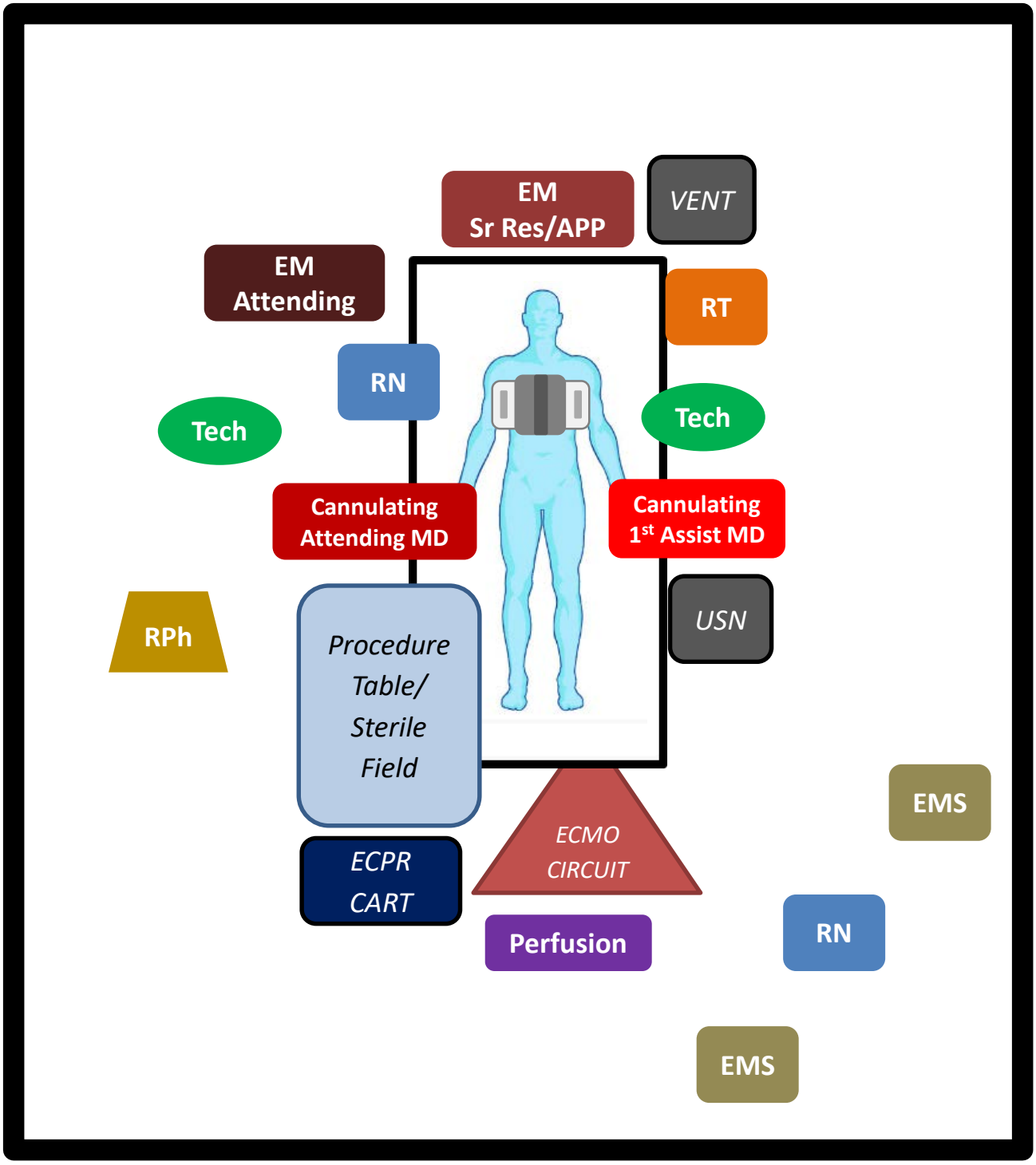
CTL RN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Sterile
Field
EMS
ECMO
CIRCUIT
ECPR
CART
Perfusion
RN
EMS
CTL
RN
SW
Family

ECPR Pre-Cannulation TIME-OUT

"Does the patient meet all the following inclusion criteria?"

1. Age 13 to 70; weight ≥40kg
2. Arrest is EITHER
   a. WITNESSED; or,
   b. Initial SHOCKABLE RHYTHM; or,
   c. INTERMITTENT ROSC
3. ECPR can be initiated within roughly 60 minutes of estimated time of initial arrest
4. ECPR and full ICU care are consistent with patient's wishes (if known by family at bedside)

"Does the patient have any of the following exclusions?"

1. Estimated BMI >40 due to morbid obesity
   i.e. >300lbs at 6' tall; >250lbs at 5'6" tall; cannot fit in LUCAS device
2. Cannot safely anticoagulate
   e.g. Trauma, aortic dissection, ICH, uncontrolled bleeding
3. Adult who cannot perform ADLs at baseline, including (if known or reported by family)
   i. Brought in from nursing home, SNF, or LTAC
   ii. Not oriented to self and place and/or not conversational
4. Advanced comorbidities (if known or reported by family):
   i. Oxygen-dependent lung disease
   ii. Previously evaluated and deemed not a candidate for LVAD
   iii. ESRD requiring dialysis
   iv. ESLD, including jaundice, ascites, varices, and/or transplant list
   v. Metastatic cancer and/or receiving chemo or radiation
5. DNR/DNI (if known or reported by family)
6. Attending physician perception of futility, including
   i. ETCO2 <10mmHg for >20minutes