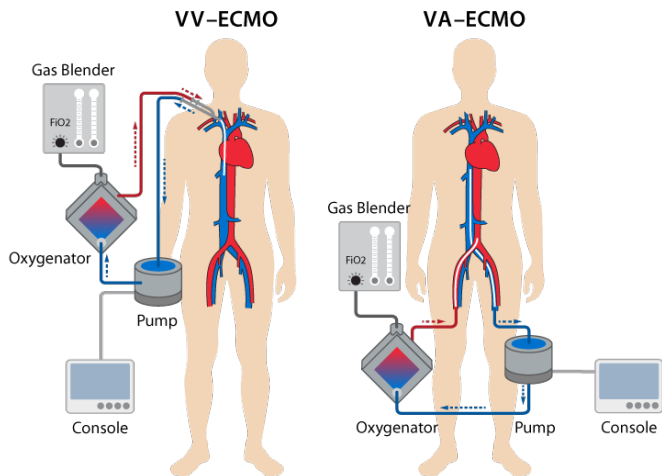


# EXTRA-CORPOREAL MEMBRANE OXYGENATION (ECMO)

Mode of cardiopulmonary support used to treat pulmonary and/or cardiovascular failure with an external artificial circuit

## ECMO GOALS

- Maintain adequate **tissue oxygenation** to allow recovery from potentially reversible cardiopulmonary failure
- Adjust ventilator settings with very low tidal volumes, allowing for **lung rest**, minimizing further ventilator-induced lung injury
- ECMO is a **bridge**, not a destination



## HOW DOES IT WORK?

- **Veno-Arterial (VA)**
  - Supports heart and lungs (complete cardiopulmonary support)
  - Blood drains – venous system
  - Blood returns – arterial system
- **Veno-Venous (VV)**
  - Supports lungs (pulmonary support only)
  - Blood drains – venous system
  - Blood returns – venous system
- **E-CPR**
  - Rapid deployment of VA-ECMO when CPR is unsuccessful in achieving sustained return of spontaneous circulation

## PARAMETERS

- **Flow** (mL/kg/min)
  - Dial in RPMs and flow depends on resistance in patient & circuit
  - Generally set between 4-6 L/min (100-150 mL/kg/min in children)
  - On **VA-ECMO** – flow supports **cardiac output**
  - On **VV-ECMO** – flow supports **oxygenation**
- **Sweep** (L/min)
  - Sweep gas flow determines  $PCO_2$  clearance (ie, ventilation) for both VV- & VA-ECMO

## OXYGEN DELIVERY

- From both lungs & oxygenator
- Assess perfusion (eg, NIRS,  $SVO_2$ , lactate)

## REST SETTINGS

- If ventilated, frequently placed on low “rest” settings with moderate PEEP
- Bronchoscopy may be needed for plugging

## ANTICOAGULATION

- To reduce risk of thromboembolism in circuit
- Done per institutional protocol

## ELECTROLYTE REPLACEMENT

- Particularly  $Ca^{+}$  due to citrate binding

## POTENTIAL COMPLICATIONS

### MECHANICAL ISSUES

- Circuit thrombus or hemolysis
  - Differences between pre- and post-pressures across oxygenator can provide early warning about potential thrombus
- Oxygenator failure or thrombus
- Pump failure or air emboli rare

### INFECTION & SYSTEMIC INFLAMMATORY SYNDROME

- May not have fever due to circuit temp regulation

### ISCHEMIA & END ORGAN FAILURE

- Stroke or limb ischemia
- Renal injury, lung injury

### DELIRIUM & MUSCLE WEAKNESS

- From prolonged sedation & immobilization
- Early mobilization & rehab are crucial

### BLEEDING

- Cerebral hemorrhage or insertion site bleeding
- Common complication (30%-40%)