## **ELSO Standardized Core Curriculum for Adult ECMO**

Title	Learning Objective	Learning Objective	Learning Objective
ECMO Overview	□Describe the different modes of ECMO support.	□Discuss global trends in ECMO utilization.	
History of ECMO	□List the key milestones in the development of ECMO.	□Describe the evolution of the Extracorporeal Life Support Organization.	
Circuit Overview	□Define the main components of an ECMO circuit.	□List circuit monitoring tools.	
Cannulas and Tubing	□Describe the differences in ECMO cannula design.	□List the considerations for selecting the appropriate ECMO cannula.	
Pump	□Describe the requirements of a blood pump used in ECMO.	□Explain the physics and working principles of a centrifugal pump.	
Membrane Lung and Blender	□Describe the structure and function of the membrane lung	□Describe the function of the blender	
Pressure Monitoring	□List the different pressure zones in an ECMO circuit	□Discuss the utility of monitoring drainage pressure	□Discuss the utility of monitoring pre- and post-membrane lung pressures
Other Circuit Components	□Describe the utility of the flowmeter	□Describe the function of the heater	□Describe the utility of circuit clamps
Cannulation	□List the differences between percutaneous and open cannulation	□Outline the process of percutaneous cannulation	□Discuss the role of ultrasound in cannulation
VV ECMO Configurations	□List the different configurational options for VV ECMO	□Review the benefits and limitations of specific configurations	
VA ECMO Configurations	□List the different configurational options for VA ECMO.	□Review benefits and limitations of specific configurations.	
Cannulation Complications	□Identify complications of ECMO cannulation	□Describe steps to prevent, recognize, and treat complications	
Oxygen Delivery & Uptake	⊠Describe the normal physiology of oxygen delivery and uptake.		

Gas Transfer in the Membrane Lung	□Describe the key determinants of oxygen uptake in the membrane lung.	□Describe the key determinants of carbon dioxide removal in the membrane lung.	
Hemodynamic Monitoring on VV ECMO	□List the hemodynamic changes that accompany VV ECMO	□Describe the changes in hemodynamic monitoring on VV ECMO	
Hemodynamic Monitoring on VA ECMO	□Discuss the hemodynamic changes that accompany VA ECMO	□Describe the changes in hemodynamic monitoring on VA ECMO	
Drainage Insufficiency	□Define and diagnose drainage insufficiency.	☐Troubleshoot drainage insufficiency.	
Return Obstruction	☐Define return obstruction and identify its causes.	□Diagnose and manage return obstruction.	
Respiratory Failure	□Provide an overview of respiratory failure	□List standard management strategies for respiratory failure	□Discuss the rationale of VV ECMO in respiratory failure
Patient Selection for VV ECMO	□List the indications and contraindications for VV ECMO support.		
Initiation of VV ECMO	□Describe the steps in initiating a patient onto VV ECMO.		
VV ECMO Maintenance	□Describe titration of blood flow and gas flow to achieve adequate support on VV ECMO	□Describe the concept of native lung rest	
Recirculation	□Define and identify recirculation.	□Troubleshoot recirculation.	
Weaning VV ECMO	□Describe the process of weaning VV ECMO support.	□List exit strategies for the VV ECMO patient.	
Cardiac Failure	□Provide an overview of cardiac failure	□List standard management strategies for cardiac failure	□Discuss the rationale of VA ECMO in cardiac failure
Patient Selection for VA ECMO	□List the indications and contraindications for VA ECMO support.		
Initiation of VA ECMO	□Describe the steps for initiating a patient		
VA Maintenance	□Describe vasopressor use and blood flow	□Describe the concept of native heart rest.	□Describe ventilator management and blood

	titration for cardiovascular support.		and gas flow titration for pulmonary support.
Left Ventricular Distention PRIORITY	□Describe the mechanism of LV distention	□List strategies to unload the left ventricle	
Differential Oxygenation	□Define and identify differential oxygenation.	□Troubleshoot differential oxygenation.	
Weaning VA ECMO - - PRIORITY	□Describe the process of weaning VA ECMO support	□List exit strategies for the VA ECMO patient	
Sedation	□Identify the role of sedation during ECMO support.	□Discuss the paradigm shift towards awake ECMO.	
Physiotherapy	□Describe the rationale for physiotherapy during ECMO.	□Identify appropriate candidates for physiotherapy on ECMO.	
Anticoagulation	□List anticoagulation strategies on ECMO.	□Discuss anticoagulation monitoring on ECMO.	
Procedures	□Discuss considerations for procedures on the ECMO patient.		
Renal Replacement Therapy	□Identify the benefits and limitations of administering RRT via a dialysis catheter.	□Identify the benefits and limitations of administering RRT via the ECMO circuit.	
Hospital Transport	□Identify considerations and logistics for intrahospital transport.	□Identify considerations and logistics for interhospital transport.	
Complications Overview	□List medical and mechanical complications of ECMO.		
Neurological Complications	□List the etiology and risk factors for neurological complications.	□Discuss the management of ischemic and hemorrhagic strokes.	
Bleeding	□List the etiology of bleeding	□Discuss the management of bleeding	
Thrombosis	□List the etiology of thrombosis	□Discuss the management of thrombosis	

Hemolysis	□Understand the etiology and risk factors of hemolysis on ECMO	□Discuss how to prevent and manage hemolysis	
Limb Ischemia	□List the risk factors for developing limb ischemia on VA ECMO	□Describe how to monitor limb perfusion	□Discuss the prevention and management of limb ischemia
Cardiac Arrest During ECMO	□Discuss the management of cardiac arrest on VV ECMO	□Discuss the management of cardiac arrest on VA ECMO	
Pump Failure	□Define pump failure.	□Describe how to identify and manage pump failure.	
Membrane Lung Dysfunction	□Define membrane lung dysfunction.	□Describe how to diagnose and manage membrane lung dysfunction.	
Air Embolism	□Define air embolism and its determinants.	□Define strategies to prevent air embolism.	□Describe how to detect and manage air embolism.
Circuit Disruption	□Identify determinants of circuit disruption	□Recognize early signs of circuit disruption	□Manage circuit disruption
Accidental Decannulation	☐Manage an accidental decannulation		
Coming Off ECMO Emergently	□List the indications for coming off ECMO emergently	□List the steps required to come off and back on ECMO emergently	
Historical Studies	□List the historical ECMO studies and identify their limitations.		
Recent Evidence for VV ECMO	□Interpret the results and limitations of the main cohort studies on VV ECMO.	□Interpret the results and limitations of the CESAR and the EOLIA trials.	
Recent Evidence for VA ECMO	□Interpret the results and limitations of the main cohort studies on VA ECMO.	□Describe the results of trials comparing ventricular assist devices to VA ECMO	