

UPMC Procirca Adult ECMO Training Course

We welcome you to Pittsburgh, PA, for our ELSO-endorsed Adult ECMO Training Course. This document will provide an agenda for the course. All learning objectives for the didactic and simulation portions of the course are included herein. We hope you have a great time and a fulfilling learning experience. Please let us know if there is anything we can do to help while you are here.

-Raj Ramanan, David Kaczorowski, Michael Lazar, Timothy Kaselitz, Veronica Garvia-Bianchini, & Keri Hickman

Course Directors



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Cardiac Surgery,
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**Veronica Garvia-
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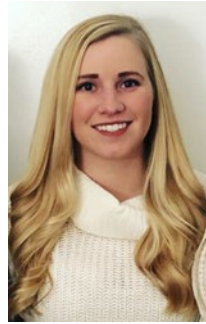
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Director, ECMO
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Course Faculty



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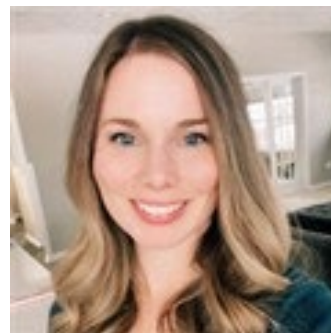
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We gratefully acknowledge the following exhibitors for their participation in this activity:

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Physician (CME)

The University of Pittsburgh designates this live activity for a maximum of 23.75 AMA PRA Category 1 Credits™. Physicians should claim only the credit commensurate with the extent of their participation in the activity.

Other health care professionals will receive a certificate of attendance confirming the number of contact hours commensurate with the extent of participation in this activity.

Faculty Disclosure:

All individuals in a position to control the content of this education activity have disclosed all financial relationships with any companies whose primary business is producing, marketing, selling, re-selling, or distributing healthcare products used by or on patients.

All of the relevant financial relationships for the individuals listed below have been mitigated:

- **David Kaczorowski, MD**
Consultant: Abiomed
CE Speakers' Bureau: Medtronic, and Abiomed
Other: Intellectual Property-ECMOTek, LCC

No other members of the planning committee, speakers, presenters, authors, content reviewers and/or anyone else in a position to control the content of this education activity have relevant financial relationships with any companies whose primary business is producing, marketing, selling, re-selling, or distributing healthcare products used by or on patients.



DAY 1 (TUESDAY, OCTOBER 20):

7:00-7:30 a.m. Registration and Breakfast

7:30-8:00 a.m. Welcome and Overview Keri Hickman, CCP

ECMO OVERVIEW

Different modes of ECMO support

Global trends in ECMO utilization

8:00-9:30 a.m. Past to Present: History and Recent Evidence Holt Murray, MD

HISTORY OF ECMO

List the key milestones in the development of ECMO

Describe the evolution of the Extracorporeal Life Support Organization

HISTORICAL STUDIES

List the historical ECMO studies and their limitations

RECENT EVIDENCE FOR VV ECMO

Interpret results and limitations of the main cohort studies on VV ECMO

Interpret results and limitations of the CESAR and the EOLIA trials

RECENT EVIDENCE FOR VA ECMO

Interpret results and limitations of the main cohort studies on VA ECMO

Interpret results of studies/trials comparing temporary VADs to VA ECMO

8:30-9:00 a.m. Circuit Components Brandon D'Aloiso, CCP

CIRCUIT OVERVIEW

Define the main components of an ECMO circuit

List circuit monitoring tools

CANNULAS & 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 & 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

OTHER CIRCUIT COMPONENTS

Describe the utility of the flowmeter

Describe the function of the heater

Describe the utility of circuit clamps

9:00-9:30 a.m. Configurations & Cannulations Michael Lazar, MD

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

9:30-9:45 a.m. Break

9:45-10:30 a.m. ECMO Physiology Raj Ramanan, MD

OXYGEN DELIVERY & UPTAKE

Describe the normal physiology of oxygen delivery and uptake

GAS TRANSFER IN 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 OF VV

List the hemodynamic changes that accompany VV ECMO
Describe the changes in hemodynamic monitoring on VV ECMO

HEMODYNAMIC MONITORING OF VA

Discuss the hemodynamic changes that accompany VA ECMO
Describe the changes in hemodynamic monitoring on VA ECMO

10:30-11:00 a.m. Inter-Hospital Transport Frank Guyette, MD

INTERHOSPITAL TRANSPORT

Identify considerations and logistics for interhospital transport

11:00-11:30 a.m. Daily Management for the ECMO Specialist Keri Hickman, CCP

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

INTRAHOSPITAL TRANSPORT

Identify considerations and logistics for intrahospital transport

11:30am-12:30 p.m. Lunch

12:30-1:00 p.m. Daily Management for the ECMO Provider Timothy Kaselitz, MD

SEDATION

Identify the role of sedation during ECMO support
Discuss the paradigm shift towards awake ECMO

PROCEDURES

Discuss considerations for procedures on the ECMO patient

PHYSIOTHERAPY

Describe the rationale for physiotherapy during ECMO

Identify appropriate candidates for physiotherapy on ECMO

1:00-1:15 p.m. Introduction to Simulation Keri Hickman, CCP

1:15-5:00 p.m. Simulations

Instructors: Raj Ramanan, Veronica Garvia-Bianchini, Timothy Kaselitz, Keri Hickman, Brandon D'Aloiso, Alyssa McCune, Tyler Eadie, Amber Palmer

5:00 p.m. Adjournment Day One



DAY 2 (WEDNESDAY, OCTOBER 21):

7:00-7:30 a.m. Breakfast

7:30-8:00 a.m. Respiratory Failure Timothy Kaselitz, MD

Provide an overview of respiratory failure
List standard management strategies for respiratory failure
Discuss the rationale of VV ECMO in respiratory failure

8:00-9:00 a.m. Patient Selection for VV ECMO Raj Ramanan, MD

List the indications and contraindications for VV ECMO support

9:00-9:45 a.m. Management of VV ECMO Raj Ramanan, MD

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

WEANING VV ECMO

Describe the process of weaning VV ECMO support
List exit strategies for the VV ECMO patient

9:45-10:00 a.m. Break

10:00-10:30 a.m. VV ECMO Case Vignettes Raj Ramanan, MD

DRAINAGE INSUFFICIENCY

Define and diagnose drainage insufficiency
Troubleshoot drainage insufficiency

RETURN OBSTRUCTION

Define return obstruction and identify its causes
Diagnose and manage return obstruction

RECIRCULATION

Define and identify recirculation
Troubleshoot recirculation

10:30-11:00 a.m. Circuit Complications Peter Arlia, CCP

(MECHANICAL) COMPLICATIONS OVERVIEW

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

11:00-11:30 a.m. Patient Complications Veronica Garvia-Bianchini, MD

(MEDICAL) COMPLICATIONS OVERVIEW 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

11:30 a.m.–12:30 p.m. Lunch

12:30-12:45 p.m. Introduction to Simulation Keri Hickman, CCP

12:45–4:30 p.m. Simulations

Instructors: Raj Ramanan, Veronica Garvia-Bianchini, Timothy Kaselitz, Keri Hickman, Brandon D'Aloiso, Alyssa McCune, Tyler Eadie, Amber Palmer

4:30 p.m. Adjournment Day Two

5:00-7:00 p.m. Exhibitor Reception

DAY 3 (THURSDAY, OCTOBER 22):

7:00-7:30 a.m. Breakfast

7:30-8:00 a.m. Cardiac Failure David Kaczorowski, MD

Provide an overview of cardiac failure
List standard management strategies for cardiac failure
Discuss the rationale of VA ECMO in cardiac failure

8:00-8:30 a.m. Patient Selection for VA ECMO Michael Lazar, MD

List the indications and contraindications for VA ECMO support

8:30-9:00 a.m. Management of VA ECMO David Kaczorowski, MD

INITIATION OF VA ECMO

Describe the steps for initiating a patient

VA ECMO MAINTENANCE

Describe vasopressor use and blood flow titration for cardiovascular support
Describe the concept of native heart rest
Describe ventilator management and blood and gas flow titration for pulmonary support

WEANING VA ECMO

Describe the process of weaning VA ECMO support
List exit strategies for the VA ECMO patient

9:00-9:30 a.m. ECPR David Kaczorowski, MD

Describe ECPR
Interpret results and limitations of the major clinical trials on ECPR
Patient selection with emphasis on inclusion and exclusion criteria
Logistics of establishing and maintaining an ECPR program

9:30-9:45 a.m. Break

9:45-10:15 a.m. VA ECMO Case Vignettes Raj Ramanan, MD

LV DISTENTION

Describe the mechanism of LV distention
List strategies to unload the left ventricle

DIFFERENTIAL OXYGENATION

Define and identify differential oxygenation
Troubleshoot differential oxygenation

10:15-10:45 a.m. Anticoagulation Ryan Rivosecchi, PharmD

ANTICOAGULATION

List anticoagulation strategies on ECMO
Discuss anticoagulation monitoring on ECMO

10:45-11:15 a.m. Coding & Billing for the ECMO Provider Jamie Deangelis MSN, ANP-BC

Describe rationale for accurate documentation
Describe process of coding & billing Quality assurance

11:15 a.m.–12:15 p.m. Lunch

12:15 p.m.–4:15 p.m. Simulations

Instructors: Raj Ramanan, Veronica Garvia-Bianchini, Timothy Kaselitz, Keri Hickman, Brandon D'Aloiso, Alyssa McCune, Tyler Eadie, Amber Palmer

4:15-4:30 p.m. Q&A with Faculty Moderator: Raj Ramanan

4:30 p.m. Course Adjournment

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