Thoracic Surgery
Clinical ECMO Fellowship

Institution: Nashville VA Medical Center & Vanderbilt University Medical Center	**Duration**: 2 years
Supervising Physician: Matthew Bacchetta, M.D.	**Contact Information**: 615-300-2900
Year of Training: PGY-4, PGY-5	

Educational Objectives:

During this fellowship, the trainee will better understand the pathophysiology of cardiopulmonary disease with special attention to advanced cardiac and pulmonary failure. The fellow will understand disease mechanisms that may lead to both acute and chronic cardiopulmonary failure, along with clinical management strategies for these disease processes. The fellow will be involved in procedural interventions for patients with cardiopulmonary failure including approaches to mechanical support and organ transplantation. The fellow must understand pre-intervention evaluation of patients with cardiopulmonary failure, potential complications of surgical intervention and mechanical support, and post-intervention management of patients requiring mechanical support. The fellow will be involved in the system level implementation of the extra-corporeal membrane oxygenation program, including education and training of providers and support staff, as well as ongoing quality and safety evaluation and improvement.

Evaluation of the trainee's understanding of the patient and disease process will be reviewed (in part) at the time of operation and through trainee-faculty interaction. Feedback will be verbal and timely; trainees are encouraged to establish a dialogue with the faculty to facilitate feedback.

Other Comments and Responsibilities

Daily rounds will include all patients on extracorporeal support. Daily management notes for all patients on extracorporeal support will the responsibility of the rounding fellow. The ECMO fellow will take ECMO call, with the cardiothoracic fellows as back-up when the ECMO fellow is off. Participation in the ECMO large animal research lab is encouraged, but not required.

Medical Knowledge and Patient Care:

I. Advanced Heart Failure

A. Anatomy, Physiology and Embryology

Learner Objectives:

- Understands the normal anatomy and physiology of the heart, peripheral vascular, and circulatory system
- Knows various operative approaches to the heart and central circulatory system

Clinical Skills:

- Recognizes the normal and abnormal anatomy of the heart and peripheral vascular system
- Able to interpret various diagnostic studies used in the evaluation of cardiac failure including invasive monitoring, cardiac catheterization, angiography, echocardiography, cross-sectional imaging, and nuclear medicine studies.
- Understands relationships and interactions between various components of cardiac physiology.

B. Evaluation and Initial management

Learner Objectives:

- Understands primary etiologies of cardiac arrest, acute heart failure, and chronic heart failure, including disease mechanisms and pathophysiology.
- Understands distinguishing features of subsets of cardiac failure including right ventricular failure, left ventricular failure, systolic dysfunction, diastolic dysfunction, acute heart failure, and chronic heart failure.
- Understands basic principles of medical management of heart failure.

- Develop familiarity with primary literature regarding cardiac arrest, advanced cardiopulmonary life support, and chronic heart failure.

Clinical Skills:

- Recognizes the clinical signs and symptoms of acute and chronic heart failure.
- Deploy and interpret modalities of invasive cardiac monitoring
- Able to initiate advanced cardiopulmonary life support
- Clinically apply fundamental principles of medical management of heart failure
- Able apply diagnostic modalities to appropriately evaluate newly identified heart failure.

C. Mechanical Circulatory Support

Learner Objectives:

- Understands the various available devices and modalities for mechanical circulatory support in acute and chronic heart failure, including their biomechanics, device settings and manipulations.
- Understand the interaction of mechanical support devices with normal cardiac physiology and impact on cardiac pathophysiology in the context of advance heart failure.
- Develop understanding and command of the primary medical literature regarding the indications, efficacy, and safety of the different modalities for mechanical circulatory support.

Clinical Skills:

- Develop competency in initiation of peripheral veno-arterial extracorporeal membrane oxygenation, including vascular cannulation and initial device management.
- Develop procedural competence with placement of peripherally inserted intra-aortic balloon pump
- Proficiently assist in the placement and initiation of central veno-arterial extracorporeal support systems
- Apply appropriate strategies for daily management of mechanical circulatory support devices.
- Able to identify and expeditiously intervene on complications related to mechanical circulatory support devices.

D. Heart Transplant

Learner Objectives:

- Understand indications and contra-indications to heart transplant
- Understand the fundamental components of appropriate evaluation for heart transplant, regarding both the organ recipient and donor organ.
- Become familiar with medical literature regarding outcomes of heart transplant
- Understand potential acute and chronic complications with associated sequelae of heart transplant.

Clinical Skills:

- Recognize patient with heart failure who may be candidates for transplantation.
- Be able to assist in executing the steps in donor heart procurement
- Recognize clinical signs and symptoms of post-transplant complications.

II. Advanced Respiratory Failure

A. Anatomy, Physiology, Embryology and Testing

Learner Objectives:

- Understands the arterial, venous and bronchial anatomy of the lungs and their inter-relationships;
- Understands the lymphatic anatomy of the lungs, the major lymphatic nodal stations, and lymphatic drainage routes of the lung segments;
- Knows the indications for different thoracic incisions, the surgical anatomy encountered, and the physiological impact;
- Knows how to interpret pulmonary function tests.

Clinical Skills:

- Reads and interprets pulmonary function studies, ventilation/perfusion scans, pulmonary arteriograms and arterial blood gases, and correlates the results with operability;
- Applies knowledge of thoracic anatomy to the physical examination of the chest, heart, and vascular tree;
- Uses knowledge of chest, pulmonary, and cardiac physiology to interpret tests involving the thoracic cavity and to understand and treat diseases of the chest and its contents;
- Reads and interprets plain radiography, CT scans, magnetic resonance imaging, and PET scanning of the chest.

B. Evaluation and Initial Management

Learner Objectives:

- Understands primary etiologies of acute and chronic respiratory failure, including disease mechanisms and pathophysiology
- Understands basic principles of management of respiratory failure, including mechanical ventilation.
- Develop familiarity with primary literature regarding acute and chronic respiratory failure.

Clinical Skills:

- Recognizes the clinical signs and symptoms of acute and chronic respiratory failure.
- Clinically apply fundamental principles of medical management of acute and chronic respiratory failure
- Able to apply diagnostic modalities to appropriately evaluate acute and chronic respiratory failure.
- Able to mechanical ventilatory support in acute and chronic respiratory failure.

C. Mechanical Circulatory Support for Respiratory Failure

Learner Objectives:

- Understand indications for extra-corporeal membrane oxygenation in advanced respiratory failure, including veno-venous, veno-arterial, and hybrid configurations.
- Understand the interaction of mechanical support devices with normal cardiopulmonary physiology and their impact on cardiopulmonary pathophysiology in the context of advanced respiratory failure.
- Develop understanding and command of the primary medical literature regarding the indications, efficacy, and safety of the different modalities for extra-corporeal membrane oxygenation for acute and chronic respiratory failure.
- Understand the various available devices and modalities for extra-corporeal membrane oxygenation in acute and chronic respiratory failure, including their biomechanics, device settings and manipulations
- Understand potential mechanical failures of extra-corporeal membrane oxygenation during use for respiratory failure.

Clinical Skills:

- Develop competency in initiation of peripheral extracorporeal membrane oxygenation, including procedural vascular cannulation and initial device management.
- Apply appropriate strategies for daily management of all relevant configurations of extra-corporeal membrane oxygenation devices in their application for respiratory failure.
- Able to identify, troubleshoot and expeditiously intervene on complications related to extra-corporeal membrane oxygenation devices and circuits.

D. Lung Transplant

Learner Objectives:

- Understand indications and contra-indications to lung transplant
- Understand the fundamental components of appropriate evaluation for lung transplant, regarding both the organ recipient and donor organ.
- Become familiar with medical literature regarding outcomes of lung transplant
- Understand potential acute and chronic complications of lung transplant

Clinical Skills:

- Recognize patient with respiratory failure who may be candidates for transplantation.
- Be able to appropriate assess suitability of the donor organ at the time of procurement
- Perform all the fundamental steps of the donor lung procurement
- Recognize clinical signs and symptoms of post-transplant complications.

<u>Practice-Based Learning and Improvement</u>

Trainees must demonstrate the ability to investigate and evaluate their care of patients, to appraise and assimilate scientific evidence, and to continuously improve patient care based on constant self-evaluation and life-long learning. Trainees are expected to develop skills and habits to be able to meet the following goals:

- Write an accurate, detailed, and legible preoperative assessment and counseling note on all patients for which he/she serves as surgeon of record.
- Utilize assigned journal articles as well as available textbook chapters and information technology (including PubMed search and literature review)
- Participate in the education of patients, families, students, trainees, and other health professionals.

- Incorporate formative evaluation feedback into daily practice.
- Review outcomes and complications of patients who require extra-corporeal membrane oxygenation. Appropriately reflect on complications and consider practice changes and improvements.

Interpersonal and Communication Skills

- The trainee should ensure that the attending is aware of the progress of all patients on the service.
- The trainee should clearly, accurately, and respectfully communicate with nurses and other Hospital employees.
- The trainee should clearly, accurately, and respectfully communicate with referring and consulting physicians, including trainees.
- The trainee should clearly, accurately, and respectfully communicate with patients and appropriate members with their families about identified disease processes (including complications), the expected courses, operative findings, and operative procedures.
- The trainee should ensure that clear, concise, accurate, and timely medical records are maintained on all patients.
- The trainee should be able to clearly and accurately teach medical students and junior trainees about the procedures performed on this rotation when qualified to do so by hospital and program policy.

Professionalism

Trainees must demonstrate a commitment to carrying out professional responsibilities and an adherence to ethical principles. Trainees must:

- Demonstrate compassion, integrity, and respect for others.
- Demonstrate sensitivity and responsiveness to a diverse patient population, including but not limited to diversity in gender, age, culture, race, religion, disabilities, and sexual orientation.
- Demonstrate sensitivity to issues of age, race, gender, and religion with patients, family, and members of the healthcare team.
- Demonstrate respect for patient privacy and autonomy.
- Remain honest with all individuals at all times in conveying issues of patient care.
- Respond to the needs of the patient above one's own needs and desires.
- Maintain high standards of ethical behavior in all professional activities.
- Demonstrate a commitment to the continuity of patient care to carrying out professional responsibilities or through assuring that those responsibilities are fully and accurately conveyed others acting in his/her stead.
- Understand the institutional policy on duty hours and remain compliant with all duty hour regulations. Trainees must enter the number of hours spent in the hospital into the tracking system within 24 hours of duty.
- Be properly and professionally attired at all times while engaged in patient care.
- Be properly and professionally groomed at all times when engaged in patient care.
- At all times treat patients, families, and all members of the healthcare team with respect.
- Reliably be present in prearranged places at prearranged times except when actively engaged in the treatment of a medical or surgical emergency. The trainee must notify the appropriate supervisor if he or she will be unable to be present.
- Remain compliant with all required training designated by the institution.

Systems-based practice

- The trainee should be able to assess the risks and benefits of all options for treating patients with surgical illness.
- The trainee should be able to summarize the financial costs, potential complications, and long-term expectations for planned procedures.
- The trainee should recognize the differences between the three hospital systems in which he or she will participate: federal, university, and private.
- The trainee should be able to determine the benefit of additional treatment by other services such as plastic surgery, interventional radiology, and orthopedics.
- The trainee should be able to determine and convey to appropriate individuals the instruments and other materials necessary for all procedures.
- The trainee must understand the structure of the ECMO program at VUMC and learn how to work with all parties in the system to deliver effective patient care.
- The trainee should contribute to the growth, development, and improvement of the system of ECMO care at VUMC.

Description of Clinical Experiences:

- ✓ Refer to General Surgery Residency Orientation Manual
- ✓ Daily rounds and care of patients on ECMO
- ✓ Participation in procedures related to heart transplant, lung transplant, and initiating/maintaining/concluding ECMO

Description of Didactic Experiences:

Refer to General Surgery Residency Orientation Manual

Please see the Thoracic Surgery website for exact times and locations of conferences:
https://ww2.mc.vanderbilt.edu/thoracic/49739

Evaluation Process:

Faculty will evaluate trainees based upon the ACGME core competencies. Faculty will evaluate trainees at the end of the rotation in writing. Trainees will evaluate faculty teaching and education efforts as well as each rotation at its conclusion.

Other Important Rotation Information:

- ✓ Daily rounds will include all patients on Extra-corporeal support at Vanderbilt University Medical Center.