THORACIC SURGERY 1ST YEAR RESIDENT CURRICULUM GOALS AND OBJECTIVES

for the

CARDIAC SURGERY ROTATION
PEDIATRIC CARDIAC SURGERY ROTATION
THORACIC SURGERY ROTATION

RESIDENT EDUCATION IN THORACIC SURGERY

Provided below are the specific educational objectives and clinical skill acquisition goals for residents within the Vanderbilt University Medical Center Residency Program in Thoracic Surgery. The program is under the auspices of the Residency Review Committee for Thoracic Surgery of the Accreditation Council for Graduate Medical Education (ACGME), and supported by faculty and staff within the Department of Thoracic Surgery and the Department of Cardiac Surgery.

Medical Knowledge (Learner Objectives) and Clinical Skills (Patient Care) follow. This list is meant to be a starting point for the Thoracic Surgery Resident and is not meant to preclude additional reading or independent study nor limitation of time within the operating room, general care wards, or the outpatient clinic.

Learner Objectives will be taught / learned through various means including:

- The TSDA (Thoracic Surgery Directors Association) Comprehensive Requisite Thoracic Surgery Curriculum
  - specific lectures pertaining to these topics. The web address is: http://67.94.140.20/navigation/crc_toc.htm
- Didactic and other conferences
  - posted in the Thoracic Surgery departmental area
  - posted on the web site http://www.mc.vanderbilt.edu/surgery/thoracic
- Perioperative and operative management
- Self-education and reading
- Faculty demonstration of ACGME core competencies coupled with resident counseling on a daily, or as needed, basis

EVALUATION

Evaluation of the Thoracic Surgery Resident’s understanding of the topic will be reviewed (in part) at the time of operation, or resident-faculty interaction, which exemplifies these topics. Feedback will be verbal and immediate.

Faculty will evaluate the Thoracic Surgery Residents based upon stated objectives as part of the ACGME core competencies. These portions of the curriculum will be viewed as “Medical Knowledge” and “Patient Care [e.g. operative skills, and perioperative management, etc.].” Faculty will evaluate residents at the end of the rotation, in writing, based upon these objectives and the ACGME core competencies. Additional evaluations will be conducted for operative skill performance (faculty evaluating residents), and operative skill education (residents evaluating faculty).

The remaining core competencies will be taught and evaluated as per the Goals and Objectives for Thoracic Surgery Residents.

Residents will evaluate faculty teaching and education efforts as well as the rotation. Both will occur at the conclusion of the rotation. The program will be evaluated annually.

Questions or comments can be directed to the Residency Coordinator or to Dr. Putnam, Program Director.
EVALUATION INSTRUMENTS:

The written evaluation instruments are completed in the GME System. The evaluation instruments include:

- Faculty evaluation of Resident
- Resident evaluation of Faculty
- Resident evaluation of rotation
- Resident evaluation of program
- Daily feedback from faculty to resident
- Didactic lectures
- Patient care settings
  - Operating room
  - Intensive care unit
  - General care wards
  - Outpatient clinics
  - Other
- Non-patient care settings
  - Other

OTHER COMMENTS / RESPONSIBILITIES

Daily rounds and patient care responsibilities will be assigned specific to the individual service. In general for the Adult Services, daily rounds will include the General Care Wards and the Intensive Care Unit at the VA and the Vanderbilt University Hospital.

Our residents are required to participate in
- Journal Club
- Resident Teaching Conference
- Cardiac Surgery Conference
- Thoracic Surgery Practice Management Improvement and Quality Improvement Conference
- Additional rotation specific didactic conferences

Residents are required to attend the Outpatient Clinic for their respective service at least one day per week which may include either the VA, or Vanderbilt University Hospital, or both. This opportunity for outpatient clinic may be assigned.

EDUCATIONAL GOALS / CURRICULUM

Provided below are the specific educational goals for you in your specific year of training as it pertains to your individual and residency education related acquisition of knowledge in the specialty of Thoracic Surgery. Each listing represents a section of the Comprehensive Requisite Thoracic Surgery Curriculum.
I. CHEST WALL

A. Anatomy, Physiology and Embryology

Learner Objectives: Upon successful completion of the residency program:
- Understands the anatomy and physiology of the cutaneous, muscular, and bony components of the chest wall and their anatomic and physiologic relationships to adjacent structures;
- Knows all operative approaches to the chest wall.

Clinical Skills: During the training program the resident:
- Recognizes the normal and abnormal anatomy of the chest wall.

B. Acquired Abnormalities and Neoplasms

Learner Objectives: Upon successful completion of the residency program:
- Evaluates and diagnoses primary and metastatic chest wall tumors, knows their histologic appearance, and understands the indications for incisional versus excisional biopsy;
- Knows the radiologic characteristics of tumors.

Clinical Skills: During the training program the resident:
- Performs a variety of surgical incisions to expose components of the chest wall and interior thoracic organs.

C. Congenital Abnormalities and Thoracic Outlet Syndrome

Learner Objectives: Upon successful completion of the residency program:
- Recognizes pectus excavatum and pectus carinatum, understands possible physiologic disturbances, and interprets diagnostic tests to identify such physiologic disturbances;
- Understands the indications for the operative treatment of congenital chest wall abnormalities;
- Knows the complications of reconstruction of congenital chest wall abnormalities and their management.

Clinical Skills: During the training program the resident:
- Recognizes the varied presentations of thoracic outlet syndrome and interprets diagnostic tests;
- Reads and interprets diagnostic x-ray and performs physiologic examinations for congenital chest wall defects and thoracic outlet syndromes.

II. LUNGS AND PLEURA

A. Anatomy, Physiology, Embryology and Testing

Learner Objectives: Upon successful completion of the residency program:
- 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 the indications for plain radiography, CT scan, magnetic resonance imaging, and PET scanning for staging of lung cancer;
- Knows the indications, interpretation, and use of nuclear medicine ventilation/perfusion scanning (V/Q scan) to determine the operability of candidates for pulmonary resection;
- Understands the methods of invasive staging (e.g., mediastinoscopy, Chamberlain procedure, scalene node biopsy, thoracoscopy);
- Knows how to interpret pulmonary function tests.

Clinical Skills: During the training program the resident:
- 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. Non-Neoplastic Lung Disease

Learner Objectives: Upon successful completion of the residency program:

- Understands diagnostic procedures used to evaluate non-neoplastic lung disease;
- Knows the common pathogens that produce lung infections, including their presentation and pathologic processes, and knows the treatment and indications for operative intervention;
- Understands the natural history, presentation and treatment of chronic obstructive lung disease;
- Understands the pathologic results and alterations of pulmonary function due to bronchospasm;
- Understands the mechanisms by which foreign bodies reach the airways, how they cause pulmonary pathology, and the management of patients with airway foreign bodies.

Clinical Skills: During the training program the resident:

- Diagnoses and treats patients with bacterial, fungal, tuberculous, and viral lung infections;
- Manages patients with chronic obstructive lung disease, bronchospastic airway disease, foreign bodies of the airways, and hemoptysis;
- Performs thoracentesis, mediastinoscopy, mediastinotomy, flexible and rigid bronchoscopy, thoracoscopy, and open lung biopsy.

C. Neoplastic Lung Disease

Learner Objectives: Upon successful completion of the residency program:

- Understands TNM staging of lung carcinoma and its application to the diagnosis, therapeutic planning, and management of patients with lung carcinoma;
- Evaluates and diagnoses neoplasia of the lung, using a knowledge of the histologic appearance of the major types;
- Knows the signs of inoperability;
- Understands the complications of pulmonary resection and their management;
- Understands the indications for resection of benign lung neoplasms;
- Understands the indications for resection of pulmonary metastases.

Clinical Skills: During the training program the resident:

- Evaluates patients with lung neoplasia and recommends therapy based on their functional status, pulmonary function and tumor type;
- Performs staging procedures (e.g., bronchoscopy, mediastinoscopy, mediastinotomy, and thoracoscopy);
- Performs operations to extirpate neoplasms of the lung (e.g., local excision, wedge resection, lobectomy);
- Performs bedside bronchoscopies and placement of tracheostomies and/or minitracheostomies;
- Recognizes and treats the early signs of non-cardiac pulmonary edema.

E. Diseases of the Pleura

Learner Objectives: Upon successful completion of the residency program:

- Is familiar with the clinical presentation of benign and malignant diseases of the pleura;
- Understands the types of pleural effusions, their evaluation and treatment;
- Understands the indications, contraindications, and complications of video assisted thoracic surgery and has a working knowledge of the equipment.

Clinical Skills: During the training program the resident:

- Evaluates pleural effusions and recommends appropriate therapy;
- Performs invasive diagnostic studies (e.g., incisional and excisional biopsy, needle biopsy, fluid analysis);
- Places tube thoracostomies and performs chemical or mechanical pleurodesis;
- Performs video assisted thorascopic surgery as necessary for the diagnosis and treatment of pleural disease;
- Places pleuroperitoneal shunts.
III. TRACHEA AND BRONCHI

A. Anatomy, Physiology and Embryology

Learner Objectives: Upon successful completion of the residency program:
- Understands the anatomy and blood supply of the trachea and bronchi;
- Understands the endoscopic anatomy of the nasopharynx, hypopharynx, larynx, trachea, and major bronchi;
- Understands and interprets pulmonary function studies of the trachea and bronchi;
- Understands the radiologic assessment of the trachea and bronchi.

Clinical Skills: During the training program the resident:
- Interprets plain radiographic analyses, CT scan, MRI, and pulmonary function studies involving the trachea and bronchi;
- Performs endoscopy of the upper airway, trachea and major bronchi.

B. Congenital and Acquired Abnormalities

Learner Objectives: Upon successful completion of the residency program:
- Understands congenital abnormalities and idiopathic diseases of the trachea;
- Understands the etiology, presentation and management of acquired tracheal strictures and their prevention;
- Understands the radiologic evaluation of tracheal abnormalities.

Clinical Skills: During the training program the resident:
- Evaluates diagnostic tests of the trachea and bronchi;
- Performs laryngoscopy and bronchoscopy of the trachea and bronchi, including dilation of stenoses;
- Performs tracheostomy.

IV. MEDIASTINUM AND PERICARDIUM

A. Anatomy, Physiology and Embryology

Learner Objectives: Upon successful completion of the residency program:
- Understands the anatomic boundaries of the mediastinum and the structures found within each region;
- Understands the embryologic development of structures within the mediastinum and the variations and pathologic consequences of abnormally located structures;
- Understands the radiologic assessment of the mediastinum including CT scan, MRI, contrast studies, and angiography;
- Understands the aberrations caused by pericardial abnormalities and their effects on the heart and circulation.

Clinical Skills: During the training program the resident:
- Reads and interprets mediastinal plain radiographs, CT scans, MRI, and contrast studies.

B. Congenital Abnormalities of the Mediastinum

Learner Objectives: Upon successful completion of the residency program:
- Is able to diagnose mediastinal cysts.

Clinical Skills: During the training program, the resident:
- Reads and interprets plain radiographs, CT scans, MRI's and contrast studies of congenital abnormalities of the mediastinum.

C. Acquired Abnormalities of the Mediastinum

Clinical Skills: During the training program the resident:
- Performs diagnostic tests and operations on the mediastinum;
- Recognizes the histologic appearance of mediastinal tumors.
D. Congenital and Acquired Abnormalities of the Pericardium

**Learner Objectives:** Upon successful completion of the residency program:
- Understands the physiologic consequences of increased pericardial fluid and the techniques for diagnosis and management.

**Clinical Skills:** During the training program the resident:
- Uses an understanding of abnormal physiologic findings to diagnose pericardial pathology;
- Performs diagnostic tests and therapeutic interventions for the treatment of pericardial tamponade, pericardial effusions, and constrictive pericardial disease.

V. DIAPHRAGM

A. Anatomy, Physiology and Embryology

**Learner Objectives:** Upon successful completion of the residency program:
- Knows the embryologic origin of the diaphragm;
- Understands the anatomy of the diaphragm and adjacent structures;
- Understands the neural and vascular supply of the diaphragm and the pathologic consequences of injury;
- Understands imaging studies for assessing the diaphragm.

**Clinical Skills:** During the training program the resident:
- Uses knowledge of the normal anatomy and physiology of the diaphragm to treat primary or contiguous abnormalities;
- Evaluates and interprets radiographic studies of the diaphragm, including fluoroscopy, CT scan, and MRI.

B. Acquired Abnormalities, Neoplasms

**Learner Objectives:** Upon successful completion of the residency program:
- Knows evaluation methods for penetrating injuries of the diaphragm;
- Understands the etiology, diagnosis, and treatment of diaphragmatic paralysis.

**Clinical Skills:** During the training program the resident:
- Interprets plain and contrast x-rays, fluoroscopy, CT scans, and MRI of the diaphragm;
- Performs diagnostic studies of the diaphragm (e.g., pneumoperitoneum, direct incisional and excisional biopsy, video assisted thoracoscopic surgery).

C. Congenital Abnormalities

**Learner Objectives:** Upon successful completion of the residency program:
- Understands the anatomy of congenital diaphragmatic hernias;
- Understands the physiologic consequences of diaphragmatic hernias;
- Knows the indications for operative repair of diaphragmatic hernias.

**Clinical Skills:** During the training program the resident:
- Evaluates neonates with congenital diaphragmatic hernias;
- Performs or participates in the operative treatment of infants with diaphragmatic hernias;
- Participates in the preoperative and postoperative management of multisystem abnormalities of infants with congenital diaphragmatic hernias;
- Performs operative treatment of adults with delayed presentation of diaphragmatic hernias;
- Manages eventration of the diaphragm in children and adults.

VI. ESOPHAGUS

A. Anatomy, Physiology and Embryology

**Learner Objectives:** Upon successful completion of the residency program:
- Understands the anatomy, embryology, innervation, and vascular supply of the esophagus and adjacent structures;
- Understands the physiologic function of the esophagus and pharynx;
- Understands the radiographic evaluation of the esophagus.

**Clinical Skills:** During the training program the resident:
- Interprets esophageal plain radiographs, contrast studies, CT scans, MRI, and intraluminal echo;
- Orders and interprets manometric and pH studies of the esophagus;
- Performs rigid and flexible endoscopy of the pharynx and esophagus.
C. Acquired Abnormalities

**Learner Objectives:** Upon successful completion of the residency program:
- Understands the pathophysiology, histology, complications, and diagnosis of esophageal reflux;
- Understands the indications for and principles of anti-reflux operations;
- Understands the clinical presentation, diagnosis, and management of paraesophageal hernias;
- Knows the clinical presentation, causes, diagnosis, and treatment of motility disorders of the esophagus;
- Understands the clinical presentation, diagnosis, and management of esophageal perforation;
- Understands the clinical presentation, diagnosis, and management of chemical injuries and trauma of the esophagus.

**Clinical Skills:** During the training program the resident:
- Interprets esophageal plain radiographs, contrast studies, CT scans, MRI, manometry, pH studies, and intraluminal echo;
- Performs esophagoscopy, foreign body removal and biopsy;
- Uses various operative approaches to different parts of the esophagus;
- Performs anti-reflux operations including management of strictures;
- Performs resection and reconstruction using various esophageal substitutes;
- Evaluates and manages patients with esophageal motility disorders, performs myotomy and resection of diverticula;
- Manages the complications of esophageal operations;
- Uses video assisted thoracic surgery for esophageal diseases where appropriate.

D. Neoplasms

**Learner Objectives:** Upon successful completion of the residency program:
- Understands the types of benign esophageal neoplasms, their clinical presentation, diagnosis, and treatment;
- Understands the types of malignant esophageal neoplasms, their clinical presentation, diagnosis, histologic appearance, and treatment;
- Understands the TNM staging of esophageal cancer;
- Understands the principles of patient management after esophageal resection;
- Understands the nutritional management of patients with esophageal neoplasms.

**Clinical Skills:** During the training program the resident:
- Evaluates malignant and benign esophageal tumors and recommends overall management, including neoadjuvant therapy;
- Performs diagnostic tests for esophageal neoplasms and correlates the results with clinical staging;
- Performs esophagectomy through various approaches;
- Performs reconstruction with various esophageal substitutes;
- Diagnoses and manages complications of esophageal surgery;
- Manages nutritional needs after esophageal surgery;
- Performs palliative operations for obstructing esophageal lesions.

VII. CONGENITAL HEART DISEASE

A. Embryology, Anatomy and History

**Learner Objectives:** Upon successful completion of the residency program:
- Knows the embryology and anatomy of the normal heart;
- Knows the history of congenital cardiac surgery, and the intellectual development of operations used to manage each cardiac anomaly.

**Clinical Skills:** During the training program the resident:
- Applies knowledge of the normal and abnormal anatomy of the heart to the planning and performance of operations.
B. Physiology and Physiologic Evaluation

*Learner Objectives:* Upon successful completion of the residency program:
- Understands normal fetal circulation;
- Understands the transitional nature of circulation as the fetus becomes a neonate.

*Clinical Skills:* During the training program the resident:
- Describes the physiologic changes of circulation during neonatal life;
- Diagnoses clinically important congenital heart diseases in the neonate, infant, and child;
- Applies a knowledge of anatomic abnormalities and their physiologic consequences to diagnose congenital heart defects;
- Performs calculations of blood flows and resistances from cardiac catheterization data.

C. Cardiopulmonary Bypass for Operations on Congenital Cardiac Anomalies

*Learner Objectives:* Upon successful completion of the residency program:
- Knows arterial and venous cannulation techniques for different intracardiac defects.

*Clinical Skills:* During the training program the resident:
- Performs arterial and venous cannulation and initiates cardiopulmonary bypass;
- Performs or participates in the repair of congenital heart defects using cardiopulmonary bypass.

D. Left-To-Right Shunts

*Clinical Skills:* During the training program the resident:
- Performs the preoperative evaluation of patients with each of these anomalies.

E. Cyanotic Anomalies

*Learner Objectives:* Upon successful completion of the residency program:
- Knows the anatomy and physiology of each anomaly;
- Knows the methods of diagnosis;
- Understands the role of medical management and interventional cardiology as treatment options.

*Clinical Skills:* During the training program the resident:
- Participates in or performs the major palliative operations for these congenital cardiac anomalies.

F. Obstructive Anomalies

*Program Objective:* Upon successful completion of the residency program the resident understands the anatomy and physiology of obstructive anomalies of the left and right sides of the heart and aorta, their diagnosis, management, and postoperative care, and performs the operative and non-operative treatment.

*Learner Objectives:* Upon successful completion of the residency program:
- Knows the anatomy and physiology of each anomaly;
- Knows the methods of diagnosis;
- Understands the role of medical management and interventional cardiology;
- Understands the principles of postoperative care.

*Clinical Skills:* During the training program the resident:
- Performs corrections for patent ductus arteriosus and coarctation of the aorta;
- Performs preoperative evaluation and preparation;
- Manages postoperative care;
- Uses prostaglandins in the management of patients with neonatal coarctation, interrupted aortic arch, critical aortic stenosis.

G. Miscellaneous Anomalies

*Clinical Skills:* During the training program the resident:
- Performs or assists in pacemaker insertion, systemic-to-pulmonary artery shunting for pulmonary atresia or stenosis (with or without VSD), and pulmonary artery banding for large left-to-right shunts.
VIII. ACQUIRED HEART DISEASE

A. Coronary Artery Disease

Program Objective: Upon successful completion of the residency program the resident understands the physiology of coronary circulation, the pathophysiologic causes and derangement of ischemic heart disease and the sequelae of coronary events, and performs comprehensive short and long term management.

Learner Objectives: Upon successful completion of the residency program:

- Understands the physiology of coronary circulation and the physiologic derangements caused by stenosis and obstruction;
- Understands the risks and complications of coronary artery bypass operations, coronary angiography, and percutaneous coronary artery balloon angioplasty;
- Understands the preoperative and postoperative care of patients undergoing coronary artery bypass grafting.

Clinical Skills: During the training program the resident:

- Evaluates patients with angina pectoris, unstable angina pectoris, and acute myocardial infarction;
- Reads and interprets invasive and non-invasive tests of patients with ischemic heart disease;
- Performs operative and non-operative management of patients with ischemic heart disease, including coronary artery bypass grafting using the internal mammary artery.

C. Abnormalities of the Aorta

Learner Objectives: Upon successful completion of the residency program:

- Recognizes the potential morbidity and mortality associated with aortic aneurysms and develops appropriate treatment plans for their management.

D. Cardiac Arrhythmias

Clinical Skills: During the training program the resident:

- Performs the operative and non-operative management of patients with atrial arrhythmias;
- Participates in or performs operative management of patients with ventricular arrhythmias, including placement of automatic implantable cardioverter defibrillator.

E. Valvular Heart Disease

Learner Objectives: Upon successful completion of the residency program:

- Understands the normal and pathologic anatomy of the atrioventricular and semilunar valves;
- Knows the natural history, pathophysiology, and clinical presentation of each major valvular lesion (mitral stenosis and incompetence, aortic stenosis and incompetence, tricuspid stenosis and incompetence);
- Knows the preoperative and postoperative management of patients with valvular heart disease.

IX. THORACIC TRAUMA

A. Trauma of the Chest Wall

Learner Objectives: Upon successful completion of the residency program:

- Evaluates patients with blunt or penetrating chest wall injury;
- Understands the physiology and mechanics of operative drainage of the thoracic cavity;
- Understands the operative and non-operative management of chest wall injuries;
- Understands the pathophysiology of flail chest.

Clinical Skills: During the training program the resident:

- Evaluates and treats chest wall injuries;
- Performs emergency operations to repair chest wall injuries and provides postoperative management.

B. Tracheobronchial and Pulmonary Trauma

Learner Objectives: Upon successful completion of the residency program:

- Understands clinical presentation and radiologic findings of tracheobronchial injury;
- Understands the principles of airway management;
- Understands the bronchoscopic findings of tracheobronchial and pulmonary injury;
- Understands the injuries associated with tracheobronchial and pulmonary injury.
Clinical Skills: During the training program the resident:
- Evaluates and manages patients with tracheobronchial trauma;
- Manages the airway of patients with tracheobronchial injuries;
- Performs non-operative management of pulmonary contusion;
- Performs emergency operations to repair peripheral pulmonary and hilar injuries;
- Uses precautions to avoid air embolism in patients with penetrating and blunt injuries.

C. Esophageal Trauma
Learner Objectives: Upon successful completion of the residency program:
- Understands the etiology and presentation of esophageal trauma;
- Understands the methods of assessment and diagnosis of esophageal trauma;
- Understands the management of injuries that disrupt the esophagus.

Clinical Skills: During the training program the resident:
- Evaluates and interprets diagnostic tests of patients with esophageal trauma;
- Performs the operative treatment of patients with esophageal injuries.

D. Diaphragmatic Trauma
Learner Objectives: Upon successful completion of the residency program:
- Understands the presentation, evaluation, and treatment of blunt and penetrating diaphragmatic injuries;
- Understands the evaluation and management of associated injuries.

Clinical Skills: During the training program the resident:
- Performs emergency evaluation and diagnosis of diaphragmatic and associated injuries;
- Performs operative repair of acute and chronic diaphragmatic and associated injuries.

E. Cardiovascular Trauma
Learner Objectives: Upon successful completion of the residency program:
- Evaluates patients who have sustained cardiovascular trauma;
- Understands the physiology of deceleration injuries to the thoracic aorta;
- Understands both invasive and noninvasive methods for the diagnosis of cardiovascular traumatic injuries.

Clinical Skills: During the training program the resident:
- Evaluates and treats cardiac contusion;
- Performs emergency operations to repair traumatic transactions of the thoracic aorta and provide postoperative management.

X. TRANSPLANTATION
A. Cardiac Transplantation
Learner Objectives: Upon successful completion of the residency program:
- Knows the indications for cardiac transplantation;
- Recognizes the signs and symptoms of cardiac rejection and knows the appropriate management;
- Understands the evaluation and management of organ donors;
- Knows the methods of organ harvest and preservation.

Clinical Skills: During the training program the resident:
- Manages organ donors;
- Performs organ harvest and preservation;
- Evaluates transplant recipients for signs of rejection or infection and initiates appropriate therapy.

B. Lung Transplantation
Learner Objectives: Upon successful completion of the residency program:
- Understands the evaluation and management of organ donors;
- Recognizes the signs and symptoms of lung rejection or infection and knows the appropriate management;
- Knows the methods for harvesting and preserving donor lungs.

Clinical Skills: During the training program the resident:
- Performs or participates in donor evaluation and management;
- Performs or participates in donor lung harvest and preservation;
- Manages the lung transplant recipient preoperatively and postoperatively;
- Evaluates transplant recipients for signs of rejection or infection, and initiates appropriate therapy.

C. Heart-Lung Transplantation

Learner Objectives: Upon successful completion of the residency program:
- Understands the evaluation and management of heart-lung donors;
- Knows the methods for harvesting and preserving heart-lung blocs.

Clinical Skills: During the training program the resident:
- Participates in the evaluation and management of donors for cardiopulmonary transplantation;
- Performs heart-lung bloc harvesting and preservation;
- Manages transplant recipients preoperatively and postoperatively.

XI. EXTRACORPOREAL BYPASS AND COAGULATION - BLOOD PRODUCTS

A. Physiology of Extracorporeal Bypass

Learner Objectives: Upon successful completion of the residency program:
- Understands the physiology and mechanics of membrane and bubble oxygenators;
- Understands the mechanics and operation of roller and vortex pumps;
- Understands the physiology of various extracorporeal bypass circuits and the derangements caused by their use;
- Knows the coagulation system and alterations of blood elements.

Clinical Skills: During the training program the resident:
- Uses knowledge of the effects of extracorporeal bypass to ensure its safe use;
- Recognizes the correct and incorrect set-up and operation of an extracorporeal circuit;
- Plans and uses extracorporeal circuits in clinical practice;
- Understands and treats physiologic derangements caused by blood-artificial surface interaction.

B. Techniques of Extracorporeal Bypass

Learner Objectives: Upon successful completion of the residency program:
- Understands the standard techniques for extracorporeal bypass;
- Understands the techniques of cannulation for extracorporeal bypass;
- Oversees the management of patients undergoing extracorporeal bypass.

Clinical Skills: During the training program the resident:
- Performs cannulation for extracorporeal bypass using appropriate access routes;

C. Mechanical Support

Learner Objectives: Upon successful completion of the residency program:
- Understands the indications for cardiac support with mechanical devices or ECMO;
- Understands alternatives to mechanical support (e.g., intra-aortic and intrapulmonary balloon pumping);
- Understands the principles of weaning patients from these devices.

Clinical Skills: During the training program the resident:
- Evaluates and participates in the preoperative and postoperative management of patients requiring mechanical support;
- Manages the complications from the use of mechanical support and ECMO;
- Manages the anticoagulation of patients on mechanical support and ECMO.

D. Fundamentals of Coagulation Management and Blood Component Therapy

Learner Objectives: Upon successful completion of the residency program:
- Understands the major blood groups, the clotting cascade, and the pathophysiology of clotting (e.g., abnormal clotting, activation of compliment, Kallikrein, prostanoids);
- Understands the specific hemorrhagic and thrombotic complications of cardiac surgery and their management;
- Understands the methods used in blood component storage and the measures taken to ensure a safe blood supply;
- Understands the use of specific blood components to treat abnormalities of red cell quantity and quality, platelet quantity and quality, and coagulation function;
- Knows the preoperative risk factors for excessive blood loss and blood utilization;
• Understands the operative and postoperative techniques to ensure blood conservation.

**Clinical Skills:** During the course of the program the resident:
• Evaluates patients requiring component therapy and develops management strategies to correct abnormalities of the coagulation system;
• Uses appropriate tests to ensure the safety of blood and blood components;
• Uses appropriate blood conservation techniques.

**XII. MINOR PROCEDURES**

**A. Bronchoscopy**

*Learner Objectives:* Upon successful completion of the residency program:
• Understands the indications, techniques, and complications of rigid and fiberoptic bronchoscopy of the larynx and tracheobronchial tree.

*Clinical Skills:* During the training program the resident:
• Evaluates and manages patients requiring bronchoscopy;
• Performs rigid and fiberoptic bronchoscopy using various anesthetic techniques;
• Obtains diagnostic material using various biopsy techniques;
• Uses laser techniques via bronchoscopy;
• Uses stents via bronchoscopy.

**B. Esophagoscopy**

*Learner Objectives:* Upon successful completion of the residency program:
• Understands the indications, techniques, and complications of rigid and fiberoptic esophagoscopy.

*Clinical Skills:* During the training program the resident:
• Evaluates and manages patients requiring esophagoscopy;
• Performs rigid and fiberoptic esophagoscopy using various anesthetic techniques;
• Uses laser techniques via esophagoscopy;
• Uses stents via esophagoscopy.

**C. Permanent Pacemakers**

*Clinical Skills:* During the training program the resident:
• Performs transvenous and epicardial pacemaker insertion using single and dual chamber pacemakers.

**D. Tube Thoracostomy**

*Learner Objectives:* Upon successful completion of the residency program:
• Understands the indications and contraindications for tube thoracostomy;
• Knows the techniques and complications of tube thoracostomy and their management.

*Clinical Skills:* During the training program the resident:
• Evaluates patients for tube thoracostomy;
• Performs tube thoracostomy under local, regional and general anesthesia;
• Treats the complications of tube thoracostomy.

**E. Central Venous Lines and Arterial Lines**

*Learner Objectives:* Upon successful completion of the residency program:
• Understands the indications, contraindications, management and complications of central venous lines and arterial lines.

*Clinical Skills:* During the training program the resident:
• Performs central venous line insertions by appropriate techniques (e.g., internal jugular vein, subclavian vein, femoral vein);
• Performs arterial line insertions by appropriate techniques (e.g., radial, brachial, femoral and pedal arteries);
• Manages complications of central venous and arterial lines.
XIV. NON-CLINICAL ELEMENTS OF THORACIC SURGICAL PRACTICE

Learner Objectives: Upon successful completion of the residency program:
- Understand the ethical components of surgical practice;
- Understands and will be able to use clinical database and outcome analysis in surgical practice.

XV. GERIATRICS AND THE THORACIC SURGERY PATIENT

Learner Objectives: Upon successful completion of the residency program:
- Understands the effect of aging on the major organ systems;
- Recognizes the increased mortality of thoracic surgery procedures in the age groups of patients over 65;
- Has an understanding of the more frequent morbidities that the elderly experience during the postoperative period;
- Is competent to manage common postoperative complications, including delirium, in the elderly;
- Understands the principles of decubitus ulcer prophylaxis in the postoperative period given the increased predisposition of the elderly to decubiti;
- Understands the principles of end of life decision making (living wills, durable power of attorney).

Clinical Skills: During the training program the resident:
- Participates in the preoperative assessment of elderly patients;
- Carries out discussions with the patient and families about the operative risks and postoperative course;
- Prevents and manages common postoperative complications of:
  - Delirium
  - Prolonged intubation
  - Decubitus ulcer
  - Sepsis/
  - Low output state
  - Adverse drug effects
  - Depression
  - Immobility, deconditioning, functional decline
  - Falls, fractures
  - Dehydration
  - Incontinence and UTI
- Participates in postoperative discussions both for patients doing well and for the complicated postoperative course including discussions about withdrawal of support systems;
- Works with the discharge planning team in effecting a successful setting for patient discharge.
- Participates in post-hospital discharge care in order to experience common problems of medication side effects, anorexia, arrhythmias and fluid imbalance.