Version 2025-07

THE University of Vermont MEDICAL CENTER

Pulmonary and Critical Care Medicine Fellowship Training Brochure

The Pulmonary and Critical Care Medicine division is proud to welcome you into our fellowship training program. The University of Vermont has a long tradition of training outstanding academic and clinical pulmonary physicians and intensivists. Our alumni are spread throughout the country in academia, private practice, and industry.

Today marks the real beginning of your career. You can anticipate that your training will be exciting, mentally stimulating, intriguing and challenging. We hope that you will find it to be as personally and professionally rewarding as we have. Stretch your mind and body with us, and you will be well served for your future. The faculty is committed to your education and to you as an individual.

Renee Stapleton, M.D.
Professor of Medicine
Director, Pulmonary and Critical Care Medicine Unit

Garth W. Garrison, M.D.
Associate Professor of Medicine
Program Director, Pulmonary and Critical Care Medicine Fellowship

Brittany Duchene, M.D.
Assistant Professor of Medicine
Associate Program Director, Pulmonary and Critical Care Medicine Fellowship

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Assistant Professor of Medicine
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Introduction

Enclosed in this notebook you will find the outline of your 3-year curriculum and general guidelines for your entire fellowship program. This book should serve as a reference point and as a place to keep your personal documentation.

It is expected that each fellow attends all conferences that are listed on the monthly-published calendar. Twice yearly individual evaluations of fellow performance will be conducted by the program director. You will also be expected to evaluate the faculty and the training program. Over the three-year period of training, fellows will be expected to have increasing responsibility for patient care and involvement in administrative tasks.

Pulmonary/Critical Care Fellows are expected to exhibit the highest level of professionalism at all times.

Fellows will determine that they is a core component to the training program. Each fellow must identify a research mentor early in the program and develop a substantive research project. A careful evaluation process will also guide the research aspect of the program.

Please review the entire contents of this notebook and refer to it as needed throughout your training.

Our Mission Statement

The Pulmonary and Critical Care fellowship program at the University of Vermont Medical Center seeks to educate and train skilled physicians to deliver compassionate, high-level and evidence-based care to patients with lung diseases and critical illness and to provide opportunities for further benefit to society through the development of careers in basic science, translational, and clinical research

Division of Pulmonary and Critical Care Medicine

The Division of Pulmonary and Critical Care Medicine exists within the University of Vermont Medical Center and the University of Vermont College of Medicine. Clinicians currently see outpatient pulmonary consults at the University of Vermont Medical Center (formerly called Fletcher Allen Hospital) in Burlington, Vermont and Central Vermont Medical Center in Berlin, Vermont. These clinical sites serve a large catchment area including much of Vermont and upstate New York.

The Division of Pulmonary and Critical Care Medicine is academically focused combining high level patient care with nationally recognized research. The division is closely aligned with the Vermont Lung Center, which is an interdepartmental research center focused on lung biology and lung disease. Faculty within the division of Pulmonary and Critical Care and the Vermont Lung Center have been funded by numerous grants multiple NIH RO1's, and many Airways Clinical Research Center Awards.

Relationship with the Department of Medicine

The director of the Pulmonary and Critical Care Medicine Unit, reports to the physician Leader of the Medicine Health Care Service/Chairman of the Department of Medicine. The status of clinical services, research programs, faculty development including promotion and educational activities are reviewed on a regular basis.

The level of performance of the trainees in Pulmonary and Critical Care Medicine is reported to the Chair of the Department of Medicine on an annual basis. She is required to sign all forms indicating satisfactory performance, completion of training, and eligibility for subspecialty certification. All offers of appointment for new trainees are issued jointly by the Chair of Medicine as well the Pulmonary and Critical Care Medicine program director. The Chair of Medicine is directly involved in faculty performance evaluations, advancement and assignment of responsibilities.

Relationship with the Internal Medicine Training Program

The Director of the Internal Medicine Residency Program is directly involved in planning Pulmonary and Critical Care Medicine training activities, preparing for periodic review and recertification of the training program, and developing a coordinated educational program with residents in Internal Medicine. The Director of the Pulmonary and Critical Care Medicine Unit and the fellowship training program director work closely with the Internal Medicine Residency Director to coordinate teaching and learning opportunities for trainees, including organizing core curriculum lectures for the Internal Medicine residents provided by the Pulmonary and Critical Care Medicine faculty and trainees and key didactic lectures on Pulmonary and Critical Care Medicine topics.

The Director of the Pulmonary and Critical Care Medicine training program also establishes guidelines for trainees when they are in supervisory roles, such as supervising residents in technical procedures in the ICU.

Current Pulmonary and Critical Care Medicine Faculty

	Administrative Tasks	Areas of Interest
Gilman Allen, MD	Director, Adult Critical Care Services Chair, Patient and Family Centered Care Committee Chair, Hospital Committee on Interdisciplinary Rounding Councilor, UVM chapter AOA	Respiratory mechanics Acute lung injury Ventilator-induced lung injury ICU quality-based R\research
MaryEllen Antkowiak, MD	Director, Medical Intensive Care Unit	Critical care medicine Pulmonary hypertension
Ram Baalachandran, MD	Director, NIV Clinic Site leader, CVMC	General pulmonary medicine Critical care medicine Thoracic oncology
Jessica Badlam, MD	Director, Pulmonary Hypertension Program Fellowship program core faculty	Pulmonary hypertension Critical care medicine
Jason Bates, PhD	Bioengineering core of Vermont Lung Center	Monitoring of lung function in patients and animals Automatic control of ventilatory support Mechanical determinants of bronchial responsiveness
Anusha Devarajan, MBBS		Sleep Medicine General Pulmonary and Critical Care

Anne Dixon, MD	Department of Medicine Chair Director of the Vermont Lung Center Board member, UVMMG Member, UVMMG patient care and ops committee	Asthma Obesity and Lung Disease Chronic Obstructive Pulmonary Disease General Pulmonary and Critical Care Medicine
Brittany Duchene, MD	Fellowship APD Director, Severe Asthma Clinic	General Pulmonary and Critical Care Asthma Medical Education
Joshua Farkas, MD		Critical Care Clinical ultrasonography Mechanical ventilation
Garth Garrison, MD	Fellowship program director Internal Medicine AI director	General Pulmonary and Critical Care Medicine Lung Cancer EBUS
Ena Gupta, MD	Director, ILD program Fellowship program core faculty	ILD Critical Care Medicine Pulmonary Medicine
Elena Kozakewich, MD	Director, CVMC ICU	Pulmonary Medicine Critical Care Medicine
David Kaminsky, MD	Fellowship program core faculty PFT Lab Clinical Director	Pulmonary Physiology General Pulmonary and Critical Care Medicine Asthma Small Airways Physiology
Matt Kinsey, MD	Director, Adult Bronchoscopy	Interventional Pulmonary Lung cancer
Skyler Lentz, MD	Critical Care section chief (Emergency Dept)	Critical care medicine Medical education

Suman Majumdar, MD	Fellowship APD	General Pulmonary and Critical Care Medicine Thoracic oncology
Katherine Menson, DO	Director, Pulmonary Rehabilitation Associate Program Director, IM Residency	Pulmonary rehabilitation General pulmonary medicine Critical care medicine
Katelin Morrissette, MD	Epic superuser Fellowship program core faculty	Medical informatics QI/Patient Safety Medical Education
Matthew Poynter, PhD	Associate Director, Vermont Lung Center	Pulmonary Innate and Adaptive Immunity Molecular Biology Methodology Immunoassay Methodology Animal Models of (Lung) Disease Impact of Nutritional Interventions on Immune Function
Abe Sender, PA		CF
Renee Stapleton, MD	Pulmonary & Critical Care Division Chief	Nutrition in Critical Care Acute Lung Injury End of Life Care General Pulmonary and Critical Care
Charlotte Teneback, MD	Clinical Operations Committee Director, Adult CF program Fellowship program core faculty	Adult Cystic Fibrosis (CF) Pulmonary rehabilitation General Pulmonary and Critical Care
Cameron Upchurch, MD		Critical Care Cardiovascular critical care
Sarah Wagner, NP		Interventional pulmonary
Zach Weintraub, MD	Director, Outpatient Clinic	Adult Cystic Fibrosis General Pulmonary and Critical Care Medicine

Daniel Weiss, MD, PhD		General Pulmonary and Critical Care Medicine Acute Lung Injury Gene and Cell Therapies for acute and chronic lung disease Methods of gene and cell delivery to lung Ex vivo lung bioengineering

Pulmonary and Critical Care Fellowship Program

Fellow Selection

The Pulmonary and Critical Care Medicine Division participates in the National Resident Matching Program (NRMP). Applications are submitted through Electronic Residency Application Service (ERAS). All applications are reviewed by the Fellowship Committee. Selected applicants are invited for virtual interviews with priority given to those who signal the program. Both faculty and current fellows participate in the interview process. All interviewed candidates are reviewed at a meeting by the Pulmonary and Critical Care Medicine faculty. At that meeting the applicants are chosen and ranked for the NRMP. There are 3 positions per year offered.

Program Goals and Objectives

The Pulmonary and Critical Care Medicine (PCCM) Fellowship Training Program is designed to provide advanced training to fellows to allow them to obtain competency in the specialty of PCCM with sufficient expertise to act as specialist consultants. This training is provided by both didactic instruction and direct patient care under the direct supervision of expert faculty in the division of PCCM. Didactic instruction is provided in all areas of PCCM as outlined in the specific topic areas required by the ACGME. Direct patient care is provided in a facility that allows state of the art care of both inpatients and outpatients and in a community with a broad range of medical conditions. Through these activities, the fellowship training program provides the environment and resources to allow trainees to obtain competence in the six areas of Patient Care, Medical Knowledge, Professionalism, Interpersonal Communication, Practice-Based Learning and Systems-Based Practice, as specified by the ACGME. In addition, the faculty also provides an environment of inquiry and scholarship that involves research, writing and teaching. Critical to the success of the program is a formal structure for frequent feedback and evaluation of performance. At the completion of training, trainees will be prepared to take their board certification exams in both Pulmonary Medicine and Critical Care Medicine, and to practice PCCM in either academic or community settings.

GOAL ONE

Fellows will demonstrate knowledge of physiology, pathophysiology, diagnosis, and therapy of problems pertinent to Pulmonary and Critical Care Medicine.

Objective 1: (Pulmonary Medicine knowledge areas)

Fellows will learn pathophysiology and how to diagnose and manage patients with obstructive lung diseases, including:

- Asthma including allergic and non-allergic disease

- Chronic obstructive lung disease (COPD) including emphysema and chronic bronchitis
- Cystic fibrosis
- Non-cystic fibrosis bronchiectasis

Fellows will learn pathophysiology and how to diagnose and manage patients with interstitial and inflammatory lung diseases, including:

- Idiopathic interstitial lung diseases
    - Idiopathic pulmonary fibrosis (IPF)
    - Nonspecific interstitial pneumonia (NSIP)
    - Cryptogenic organizing pneumonia (COP)
    - Lymphocytic interstitial pneumonia (LIP)
    - Acute interstitial pneumonia (AIP)
    - Respiratory bronchiolitis -interstitial lung disease (RB-ILD)
    - Desquamative interstitial pneumonia (DIP)
    - Idiopathic pulmonary fibrosis with autoimmune features (IPAF)
- ILD associated with connective tissue diseases including:
    - Rheumatoid arthritis
    - Sjogren's disease
    - Anti-synthetase syndrome
    - Lupus
    - Mixed connective tissue disease
    - Dermatomyositis
    - Systemic sclerosis
- Granulomatous lung diseases including:
    - Sarcoidosis
    - Hypersensitivity pneumonitis (HP)
    - Granulomatous lymphocytic interstitial lung disease (GLILD)
- Pneumoconiosis, including:
    - Asbestosis
    - Silicosis
- Pulmonary vasculidities and other causes of pulmonary capillaritis:
    - Granulomatosis with polyangiitis (GPA)
    - Microscopic polyangiitis (MPA)
    - Anti-GBM disease (Goodpasture's Syndrome)
    - Eosinophilic granulomatosis with polyangiitis (EGPA)
    - Idiopathic pauci-imune pulmonary capillaritis (IPIC)
- Allergic bronchopulmonary mycosis (ABPM)

- Drug-induced lung disease
- Pulmonary alveolar proteinosis

Fellows will learn pathophysiology and how to diagnose and manage patients with occupational and environmental lung diseases.

Fellows will learn pathophysiology and how to diagnose and manage patients with pulmonary vascular diseases, including:

- Deep venous thrombosis (DVT)
- Acute pulmonary embolism
- Recurrent pulmonary embolism
- Chronic thromboembolic disease
- Primary pulmonary hypertension
- Secondary pulmonary hypertension

Fellows will learn pathophysiology and how to learn and diagnose and manage patients with lung infections, including:

- Community-acquired pneumonia
- Nosocomial pneumonia
- Lung abscess
- Aspiration pneumonitis
- Tuberculosis, including tuberculous infection and active tuberculosis
- Nontuberculous mycobacterial infections
- Fungal infections of the lung

Fellows will learn pathophysiology and how to diagnose and manage patients with pulmonary manifestations of Acquired Immune Deficiency Syndrome (AIDS) and other immunodeficiency diseases.

Fellows will learn physiology, pathophysiology, and how to manage patients who have undergone lung transplantation.

Fellows will learn pathophysiology and how to diagnose and manage patients with pulmonary neoplasms, including:

- Benign neoplasms of lung
- Small cell cancer of lung
- Non-small cell cancer of lung
- Paraneoplastic syndromes of lung cancer
- Malignancies metastatic to lung

Fellows will learn pathophysiology and how to diagnose and manage patients with disorders of the pleura, including:

- Pleuritis
- Pleural effusion
- Empyema
- Fibrothorax
- Mesothelioma, benign and malignant

Fellows will learn pathophysiology and how to diagnose and manage patients with disorders of the mediastinum, including:

- Mediastinitis
- Mediastinal tumor

Fellows will learn pathophysiology and how to diagnose and manage patients with chest trauma, including:

- Rib fracture
- Flail chest
- Pneumothorax, simple and tension
- Pulmonary contusion
- Foreign body aspiration

Fellows will learn pathophysiology and how to diagnose and manage patients with acute lung injury due to inhalation and radiation, including:

- Chemical pneumonitis
- Radiation pneumonitis

Fellows will learn pathophysiology and how to diagnose and manage patients with developmental abnormalities and congenital disorders, including:

- Azygous fissure
- Pulmonary sequestration

Fellows will learn pathophysiology and how to diagnose and manage patients with genetic disorders, including:

- Cystic fibrosis
- Alpha-1-proteinase inhibitor deficiency

Fellows will learn pathophysiology and how to diagnose and manage patients with respiratory failure, including:

- Acute respiratory distress syndrome (ARDS)
- Acute and chronic respiratory failure in obstructive or restrictive lung disease

- Neuromuscular respiratory drive disorders

Fellows will learn pathophysiology and how to diagnose and manage patients with hypersomnia and sleep disorders, including:

- Sleep disordered breathing
- Obstructive sleep apnea syndrome
- Nocturnal hypoxemia secondary to COPD
- Nocturnal hypoxemia secondary to CHF
- Periodic leg movement syndrome (PLMS)
- Narcolepsy
- Insomnia

Objective 2: (Critical Care Medicine knowledge areas)
Fellows will learn pathophysiology and how to diagnose and manage patients with disorders which can cause patients to become critically ill, including:

- Cardiovascular disorders
- Respiratory disorders
- Renal disorders
- Gastrointestinal disorders
- Genitourinary disorders
- Neurologic disorders
- Endocrine disorders
- Hematologic disorders
- Musculoskeletal disorders
- Disorders of the immune system
- Infectious diseases
- Obstetric and gynecological disorders
- Anaphylaxis and acute allergic reactions
- Trauma

Fellows will learn pathophysiology and how to diagnose and manage patients with disorders secondary to critical illness, including:

- Electrolyte and acid-base disorders secondary to critical illness
- Metabolic, nutritional, and endocrine effects of critical illnesses
- Hematologic and coagulation disorders secondary to critical illness
- Pharmacokinetics, pharmacodynamics, drug metabolism, and drug excretion in critical illness

Fellows will learn pharmacology and clinical use of paralytic agents.

GOAL TWO:
Fellows will demonstrate practice skills necessary to diagnose and manage problems pertinent to Pulmonary and Critical Care Medicine.

Objective 1: (Pulmonary Medicine practice skills)
Fellows will learn how to obtain a thorough and orderly history relevant to pulmonary problems, including:

- Dyspnea, on exertion and at rest
- Cough and expectoration
- Wheezing and stridor
- History of known pulmonary diseases
- Occupational history and history of exposures
- History of past TB skin tests
- History of past chest roentgenograms
- History of previous surgical procedures

Fellows will learn how to perform a thorough and systematic physical examination relevant to pulmonary problems, and will learn to recognize and understand the significance of pulmonary and extrapulmonary signs of pulmonary diseases, including:

- Abnormal patterns of breathing, including:
- Kussmaul breathing
- Cheyne-Stokes breathing
- Thoracic-diaphragmatic dyscoordination
- Abnormal chest and diaphragm movement
- Use of accessory respiratory muscles
- Chest wall abnormalities, including:
- Kyphosis
- Scoliosis
- Pectus excavatum
- Pectus carniatum
- Straight back
- Barrel chest
- Ankylosis
- Adventitious lung sounds

Fellows will learn how to interpret laboratory data relevant to pulmonary problems, including:

- Sputum cultures and microscopic examination for bacteria, mycobacteria, fungi, and Legionella
- Sputum cytology
- Oxygen saturation (by pulse oximeter)
- Arterial blood gas (ABG)
- TB skin test
- Skin test for delayed hypersensitivity
- Sweat chloride test
- Pleural fluid analysis, including cytology, chemistry, Gram's stain, and culture for bacteria, fungi, and mycobacteria
- Transthoracic needle aspirate and biopsy
- Lung biopsy

Fellows will learn how to interpret physiologic data relevant to pulmonary problems, including:

- Pulmonary function tests
- Simple spirometry
- Spirometry before and after bronchodilator
- Inhalation challenge studies
- Lung volumes
- Diffusing capacity
- Exercise tests
- Sleep studies

Fellows will learn how to interpret radiologic imaging studies relevant to pulmonary problems including:

- Chest roentgenogram
- Fluoroscopy of the chest
- Bronchogram
- Computerized axial tomography (CT) of chest
- Radionuclide lung (V/Q) scan
- Non-invasive leg studies
- Compression ultrasonography
- Impedance plethysmography (IPG)
- Pulmonary arteriogram

Objective 2: (Critical Care Medicine practice skills)

- Fellows will learn how to obtain a thorough and orderly history on critically ill patients in an efficient and expedient manner.
- Fellows will learn how to perform and thorough and systematic physical examination on critically ill patients in an efficient and expedient manner.
- Fellows will learn how to interpret laboratory data relevant to critically ill patients.
- Fellows will learn how to interpret radiologic data relevant to critically ill patients.

GOAL THREE:

Fellows will demonstrate technical skill necessary to use specialized equipment and perform specialized procedures used to diagnose and manage problems pertinent to Pulmonary and Critical Care Medicine.

Objective 1: (Technical skills with specialized equipment)

Fellows will learn the indications, contraindications, complications, and proper use of specialized equipment for managing patients with pulmonary and critical care problems, including:

- Management of airway
    - Conscious Sedation
- Establishment of airway
- Maintenance of open airway in nonintubated, unconscious, paralyzed patients
- Oral and nasotracheal intubation
- Management of breathing and ventilation
- Ventilation by bag or mask
- Mechanical ventilation using pressure-cycled, volume-cycled, and negative pressure mechanical ventilators
- Use of reservoir masks and CPAP masks for delivery of supplemental oxygen, humidifiers, nebulizers, and incentive spirometry
- Weaning from mechanical ventilation
- Respiratory care techniques
- Management of pneumothorax
- Maintenance of circulation
- Oxygen saturation by pulse oximeter
- Arterial blood gas analysis
- Basic and advanced cardiopulmonary resuscitation
- Cardioversion
- Pulmonary function tests
    - Simple spirometry
    - Spirometry before and after bronchodilators
- Inhalation challenge studies

- Lung volumes
- Diffusing capacity
- Exercise tests
- Calibration and operation of hemodynamic monitoring and recording systems, including utilization, zeroing, and calibration of transducers, and use of amplifiers and recorders.
- Parenteral nutrition

Fellows will learn to analyze specialized data pertaining to Pulmonary and Critical Care problems, including:

- Cardiac output determinations by thermodilution and/or other techniques
- Evaluation of oliguria
- Management of massive transfusions
- Management of hemostatic defects
- Interpretation of antibiotic levels and sensitivities
- Monitoring and assessment of metabolism and nutrition
- Calculation of oxygen content, intrapulmonary shunt, and alveolar-arterial gradients
- Pharmacokinetics

Objective 2: (Technical skills performing specialized procedures)
Fellows will learn the indications, contraindications, complications, and proper technique for performing procedures relevant to pulmonary and critical care problems, including:

- Sputum induction
- Sputum Gram's stain
- TB skin tests
- Skin tests for delayed hypersensitivity
- Arterial puncture for arterial blood gas (ABG)
- Insertion of arterial catheter
- Insertion of central venous catheter
- Insertion of pulmonary artery balloon floatation catheter
- Thoracentesis
- Pleural biopsy
- Endotracheal intubation (oral and nasal)
- Flexible fiberoptic bronchoscopy, including:
- Bronchial washing
- Bronchial brushing
- Collection of samples with protected bronchial brush
- Bronchoalveolar lavage
- Endobronchial biopsy

- Transbronchial biopsy
- Transbronchial needle aspiration
- Insertion of thoracostomy (chest) tube
- Pleural sclerosis
- Use of ultrasound in central line placement and thoracentesis

Fellows will learn the indications, contraindications, and complications of, and may gain practical experience in performing, other procedures relevant to Pulmonary and Critical Care problems, including:

- Pericardiocentesis
- Transvenous pacemaker insertion
- Peritoneal dialysis
- Peritoneal lavage
- Aspiration of major joints
- Percutaneous needle aspiration and/or cutting lung biopsy
- Use of ultrasound in bedside echo
- Endobronchial laser therapy
- Intracranial pressure monitoring

GOAL FOUR:

Fellows will demonstrate ability to apply knowledge, practice skills, and technical skills to diagnose and manage patients with problems pertinent to Pulmonary and Critical Care Medicine.

Objectives (Clinical application of knowledge and skill)

Fellows will learn how to diagnose and manage patients with symptoms and signs of pulmonary disease, including:

- Dyspnea
- Cough
- Hemoptysis
- Solitary pulmonary nodule
- Lung mass
- Localized pulmonary infiltrate
- Diffuse pulmonary infiltrates
- Atelectasis
- Pleural effusion
- Pneumothorax

GOAL FIVE:
Fellows will demonstrate ability to provide cognitive and technical advice and expertise as a consulting Pulmonary and Critical Care Physician.

Objectives (Providing consultation, use of consultation)
Fellows will learn the basic constructs of the referral-consultant relationship for managing or co-managing the care of patients with pulmonary problems or patients who are critically ill.

Fellows will learn when to refer patients for procedures to be performed by a thoracic surgeon or other specialist, including:

- Thoracoscopy
- Open lung biopsy
- Mediastinoscopy
- Lung resection
- Lung transplant
- Pleural decortication
- Rib resection and open pleural drainage
- Tracheostomy
- Radiation therapy of lung

GOAL SIX:
Fellows will demonstrate knowledge of how the care of problems pertinent to Pulmonary and Critical Care Medicine fit into patients' overall health plan.

Objectives (Attitudes, values, and habits about long-term care)
Fellows will learn the importance of preventive medicine techniques in the long-term management of patients with pulmonary problems, including:

- Smoking cessation
- Influenza vaccine
- Pneumococcal vaccine

Fellows will learn the long-term impact of treating patients who are severely and critically ill.

GOAL SEVEN:
Fellows will demonstrate attitudes, values, and habits of a dedicated academic subspecialist in Pulmonary and Critical Care Medicine.

Objectives: (Life-long attitudes, values, habits and contributions)

- Teaching: Fellows will learn to take an active role in teaching common problems pertinent to Pulmonary and Critical Care Medicine to medical students, residents, and practicing physicians in CME programs.
- Management of resources and services: Fellows will learn to monitor and supervise special services relevant to
- Pulmonary and Critical Care Medicine, including:
- Pulmonary function laboratories
- Respiratory care services
- Respiratory physical therapy and rehabilitation services
- Intensive Care Units

Societal considerations: Fellows will learn the impact of pulmonary and critical care illnesses on society, including:

- The ethical, economic, and legal aspects of pulmonary and critical illnesses, including:
    - Smoking
    - Asthma
    - Chronic obstructive pulmonary disease (COPD)
    - Occupational lung diseases
    - Sleep disorders
    - Occupational Safety and Health Administration (OSHA) regulations and universal precautions, and protection of health care workers.
    - Personal impact of pulmonary and critical illnesses on patients and patients' families.

Coping skills: Fellows will learn constructive coping skills for physicians and other health care professionals who care for chronically ill pulmonary patients and for critically ill patients.

Educational Processes

Training sites and locations

All training is scheduled to occur at the University of Vermont Medical Center in Burlington, Vermont. The hospital is a 550+ bed facility serving a large predominantly rural catchment area including portions of upstate New York and much of Vermont. The hospital is a Level 1 trauma center with 21 bed medical intensive care and surgical intensive care units. Fellows may elect to participate in additional experiences outside the institution with Program Director and UVMMC GME approval.

Within the hospital, training experiences include:

- Pulmonary ambulatory center - *ACC building 5th floor, East Pavilion*
    - General pulmonary clinic
    - Pulmonary subspecialty clinics
        - Thoracic malignancy clinics
            - Lung nodule clinic
            - Interventional Pulmonary Clinic
        - Interstitial lung disease clinic
        - Pulmonary hypertension clinic
        - Cystic fibrosis clinic
        - Pulmonary rehabilitation clinic
        - Noninvasive ventilation/chronic respiratory failure clinic
        - Severe asthma clinic

- Pulmonary medicine consultation service - *UVM Medical Center*
- Medical Intensive Care Unit (MICU) - *McClure building, 4th floor*
- Surgical Intensive Care Unit (SICU) - *McClure building, 3rd floor*
- Cardiovascular Intensive Care Unit – McClure buidling, 3rd and 4th floors (shared with MICU/SICU
- Bronchoscopy suite/medical procedures unit - *ACC building, 3rd floor, West Pavilion*
- Pulmonary physiology lab - *ACC building 5th floor, East Pavilion*
- Vermont Regional Sleep Center - *University Health Center*

Typical allocation of clinical and flex-time weeks

Research pathway

	Fellowship year (total weeks)		
Rotation	F1	F2	F3
MICU*	10	4	4
Night float	8	5	4.3
Consult	10	5	2.3
Non-MICU ICU	0	4	4
Procedure	8	6	3.3
Network	0	0	4
Sleep	4	0	0
Pulmonary subspecialty	4	0	0
Flex/research	2	24	26
Orientation	2	0	0

Medical education pathway

	Fellowship year (total weeks)		
Rotation	F1	F2	F3
MICU*	12	8	6
Consult	14	8	4
Night float**	12	8	6
Research***	2	22	30
SICU	4	4	0
Sleep	2	0	0
Pulmonary subspecialty	2	2	2
Orientation	2	0	0

Clinical excellence pathway

	Fellowship year (total weeks)		
Rotation	F1	F2	F3
MICU*	12	8	6
Consult	14	8	4
Night float**	12	8	6
Research***	2	22	30

SICU	4	4	0
Sleep	2	0	0
Pulmonary subspecialty	2	2	2
Orientation	2	0	0

*for fellows matching for AY 2025-2026 and onward

Totals:

- ICU experience 54.8 weeks (13 months)
    - MICU 42.1 weeks (10 months)
    - Non-MICU ICU 12.68 weeks (3 months)
- Pulmonary experience = 39.2 months (9 months)
- Flex experience = 52 weeks (12 months)
- Vacation = 12 weeks (3 months)

*MICU experience includes MICU and CICU patients with approximately 10% of admissions having a primary neurologic disease
**Night float experience covers both Pulmonary inpatient services and Medical ICU services. For purposes of calculation, this rotation is approximately 20% Pulmonary coverage and 80% MICU coverage
**2 weeks of research in year 1 are allocated for mentor meetings. External rotations may occur during research time when appropriate

Typical allocation of weekend day shifts

Fellows will be generally scheduled for weekend days with the following schedule:
F1: 22 per year
F2: 18 per year
F3: 12 per year

Weekend days may be scheduled consecutively (Saturday and Sunday together) as long as ACGME requirement of 1 day off in 7 when averaged over a 30 day period is met.

Typical schedule for weekly conferences

	Monday	Tuesday	Wednesday	Thursday	Friday
08:00 AM to 9:00 AM					Medicine Grand Rounds
9:00AM to 10:00 PM		VLC Research Conference			
12:00 PM to 1:00 PM	PCCM Fellows Core Lecture Series	PCCM Procedure Conference	Outpatient Fellows Conference	PCCM Grand Rounds	
1:00 PM to 2:00 PM	Multidisciplinary Lung Cancer Conference				

Attendance at Monday conferences is required unless on vacation or leave. Night float fellows on home call may join the meeting virtually.

Attendance at Wednesday conferences is required for those with scheduled continuity clinic.

Attendance at Thursday conferences is required unless on night float or vacation/leave

Faculty are expected to hold the consult and ICU pagers for fellows who are attending required conferences.

Regional and National Meetings

Northern New England Fellows Conference each Spring. The Fellows' Conference is attended by fellows and faculty from Maine Medical Center, Dartmouth Medical Center, UVM, Albany Medical Center and Bay State Medical Center. Fellows from each of the institutions present cases with formal didactic discussions and selected fellows present their research.

National Meetings: Fellows are encouraged to submit abstracts for presentation at national meetings. Typically, fellows in their 2nd and 3rd years will attend the American Thoracic Society International Conference or the CHEST conference. Individual research mentors are

responsible for supervising this activity (e.g., ACCP each Fall and ATS each Spring).

Training Requirements

The training program is accredited by the American Council on Graduate Medical Education (ACGME). The training requirements are compliance with ACGME guidelines for Pulmonary and Critical Care (Internal Medicine) and requirements outlined by the American Board of Internal Medicine (ABIM).

1. Clinical Training Requirements

- Total training time of at least 33 months (3 years minus vacation/personal days)
- A minimum of 9 months of inpatient and outpatient Pulmonary Medicine
- A minimum of 9 months of critical care medicine
    - A minimum 6 months MICU
    - A minimum 3 months non-MICU critical care (SICU)
- Continuity clinic must occur throughout the 3-year training period
    - 6 months may be excused during clinically heavy rotations and vacation
    - A minimum of 24 months of clinic are required

2. Scholarly Requirements

- Active participation in scholarly activity under the supervision of a UVM mentor (may be outside of the division with co-mentor within the division)
    - Scholarly work must be presented at a national or regional meeting
    - Scholarly work should generally lead to manuscript submission
- Participation in patient safety and/or quality improvement activities

Duty Hours

Duty hours are defined as all clinical and academic activities related to the residency program, i.e., patient care (both inpatient and outpatient), administrative duties related to patient care, the provision for transfer of patient care, time spent in-house during call activities, and scheduled academic activities such as conferences. Duty hours do not include reading and preparation time spent away from the duty site. Duty hour reporting will be collected in New Innovations per UVMMC GME policies.

- **Duty hours must be limited to 80 hours per week**, averaged over a four-week period, inclusive of all in-house call activities.
- **In-house call must occur no more frequently than every third night** (this cannot be averaged over a 4 week period). Continuous on-site duty, including in-house call, must not exceed 24 consecutive hours. Trainees may remain on duty for up to 4 additional hours to participate in didactic activities, transfer care of patients, conduct outpatient clinics, and maintain continuity of medical and surgical care as defined in Specialty and Subspecialty Program Requirements. No new patients, as defined in Specialty and Subspecialty Program Requirements, may be accepted after 24 hours of continuous duty.
- Residents must be provided with **1 day in 7 free from all educational and clinical responsibilities**, averaged over a 4-week period, inclusive of call. One day is defined as one continuous 24-hour period free from all clinical, educational, and administrative activities.
- Adequate time for rest and personal activities must be provided. This should consist of a 10-hour time period provided between all daily duty periods and 14 hours after in-house call.

Fatigue management

The program director and the faculty continuously monitor the demands of call in their programs and make scheduling adjustments as necessary to mitigate excessive service demands and/or fatigue.

The Pulmonary and Critical Care Medicine Unit follows the “Fatigue Management Policy and Duty Hour Policy” provided by the Office of Graduate Medical Education. The Fellow call schedules are specifically designed to adhere to duty hours requirements. However, in the event that a fellow become overly fatigued or needs relief from their current duties on the basis of duty-hours, the Fellow will receive backup coverage from either the Resource Attending or another Fellow.

Supervision

Inpatient services

On both inpatient services (MICU and Pulmonary Consult), an attending physician rounds with the trainees seven days a week. An attending physician is in-house and available 24 hours a day, 7 days a week to supervise the trainees including weekends and night shifts. Each patient seen by a trainee is seen by the PCCM attending. This oversight includes the presentation of the patient by the trainee including past medical records, history, physical and laboratory data, and review of all pertinent radiographs. The data are then corroborated at the bedside with the trainee including key historical and physical exam items. The differential diagnosis and approach to diagnostic testing and treatment are reviewed. All active patients are reviewed in detail regarding clinical course, new problems, results of diagnostic testing, and response to therapy on daily follow-up rounds.

Circumstances and events in which fellow must communicate with supervising faculty:

- Admissions to the ICU
- Disagreement in disposition between sending/accepting services
- Pulmonary or Critical Care consult requested
- ICU patient death
- ICU patient cardiac arrest/ACLS
- Significant medical errors leading to patient harm
- Unanticipated and/or significant procedural complications
- Change in patient goals of care

Ambulatory clinics

Each Fellows clinic is staffed by an attending physician from the faculty. To allow the trainees to be supervised by a number of attendings to maximize their learning experience while balancing the patients need for continuity of care, attendings rotate each week. The continuity clinic runs the length of the training program and fellow trainees attend this clinic regardless of their other service activities. Faculty do not attend clinic when they are assigned to the MICU. This allows fellow attention to be focused on their clinic patients while providing adequate ICU oversight.

Clinical and Research Mentors

Each fellow is assigned a faculty member from the Pulmonary and Critical Care Medicine Unit to be their mentor at the beginning of the first year of fellowship. These mentors are responsible, in conjunction with all the faculty, for the well-being of their assigned fellow. In addition, a faculty member involved in research will also be assigned during the first year in

order facilitate the fellow choosing a faculty mentor for research and a research project during their 2nd and 3rd years. The fellow will choose a research mentor at the beginning of the second year of fellowship. These mentors are responsible for guiding the research careers of their fellows

Graded Responsibility

An important part of the training program is the development of skills that will be important in the practice of medicine after fellowship. These include developing professional relations with colleagues and staff, refining teaching and presentation skills, fostering independent decision making, and understanding administrative aspects of Pulmonary and Critical Care Medicine. To develop those skills, graded levels of responsibility have been designed into the curriculum.

Teaching responsibilities

Fellows will develop skills in teaching. In the first year of training, this will include active participation in teaching rounds and didactic lectures. In the second year, fellows will be expected to give one major teaching conference to attendings and housestaff. In the third year, fellows will be expected to assist in the teaching curriculum for first and second year fellows including organizing lectures and conferences

Patient care

In general, fellows will increase their ability to perform patient care activities with decreasing direct involvement by faculty over time. Specific areas with increasing responsibility occur with procedural training and MICU service.

Procedures – Trainees will assume graded levels of responsibility in performing invasive procedures based on faculty evaluations. Fellows will observe the proper technique for a specific procedure. Fellows will then perform the procedure under direct supervision. Based on faculty approval, fellows will be permitted to instruct and supervise other trainees under the direct supervision of a faculty member.

Medical Intensive Care Unit (MICU) Service – Fellows develop increased autonomy during the 2nd and 3rd years and will play a leading role in running rounds.

Practice management

Additional opportunities to gain knowledge in managerial aspects of Pulmonary and Critical Care Medicine can be provided and may include participation on hospital QA committees, the nutrition services committee, and the hospital pharmacy committee. Fellows may also participate in the management of aspects of the pulmonary division including bronchoscopy services, outpatient services, and sleep clinic.

PCCM Vacation and time-off policy

Vacation and personal days overview:

Per the Housestaff contract with UVMMC GME, fellows will be entitled to four weeks of paid vacation (paid as 20 weekdays) and five personal days per year. During training, an additional 5 days for job interviews may be taken. Aside from interview days, unused days off do not accrue or roll over to the following year. Interview days may not be converted to personal days. "Vacation" will be generally start on a Monday and include the following weekend. When possible, reasonable efforts will be made to avoid scheduling overnight responsibilities on the Sunday prior to a vacation being taken. Vacation may be taken in 1- or 2-week blocks, as the schedule allows. Vacation cannot be scheduled when assigned to MICU, Night Float, Sleep, or Consult rotations and should not be scheduled when assigned to research exploration in year 1. If vacation is needed during these times, the fellow will identify a coverage swap with another individual.

During a vacation period, fellows will not be responsible for responding to email or Epic messages and will have continuity clinic cancelled. Prior to the start of each academic year, fellows will have four continuity clinics closed to accommodate shifting patients for vacation requests.

During personal days, fellows will not be expected to cover their inbox and are not expected to respond to pages/calls. Fellows are not expected to use personal days for medical or other important appointments when they remain available for the majority of the day.

Vacation procedures:

- Unless there is an urgent need, vacation time should be identified at least **16 weeks prior** to the intended date to allow time for patients to be rescheduled into open clinic spots.
- Vacation requests should be communicated in writing first to the Program Director. If approved, vacation requests will be forwarded to the Program Coordinator.
- After vacation is approved:
    - The fellow will send request for clinic closure to the Pulmonary Clinic scheduling lead. The fellow will identify the specific clinic(s) to close and, if appropriate, which clinic(s) to reopen.
    - The fellow will notify the fellow(s) coordinating the weekend schedule to ensure they are not scheduled during the vacation period.
    - The fellow will verify that they are not responsible for CPET interpretation or other commitments
    - 2 weeks prior to vacation, the fellow should ensure that clinic patients are not scheduled the week(s) of vacation and notify the Program Director and clinic scheduling lead if patients remain on the schedule
- During the vacation period:

- The fellow's Epic inbox should be covered by either the consult fellow or another fellow that agrees
- Epic chat status should be changed to "do not disturb" and an out of office email response should be turned on in Outlook
- PAS should be notified by the fellow that they are unavailable by page

Personal days procedures:

- Personal days are available for illness or other urgent needs that arise during the year
- Unlike vacation days, personal days do not necessarily include the subsequent weekend
- It is encouraged to limit use of personal days during core rotations (MICU, consult, NF) unless there is urgent need
- If a personal day is used during a core rotation (MICU, consults, night float), the backup fellow will be expected to cover
- If personal days are used on a clinic day, an alternate clinic must be opened
- When taking a personal day, the program director and program coordinator must be notified

Extended leave:

UVMMC is compliant with the Family and Medical Leave Act (FMLA) and Vermont's Parental and Family Leave Law (VPFL), allowing for up to 12 weeks of job-protected leave per year for personal or family related needs. For maternity leave, UVMMC provides up to 6 weeks of paid leave following vaginal delivery and up to 8 weeks of paid leave following Cessarian section or complicated vaginal delivery. Once during fellowship, fellows may take up to 7 weeks of qualifying caregiver leave as paid time off. If taken, "leave of absence" may be recorded in the training record. Extended leave will generally be taken in place of research and elective time.

Extended leave procedures:

- Fellow should notify program director as early as possible about the need for extended leave
- Clinics during the leave period should be cancelled as soon as the need is identified
- Fellows should contact the GME office for insurance overage contact information to apply for paid leave
- Clinics missed during the leave period may need to be rescheduled

Vacation, leave, and extension of training:

The American Board of Internal Medicine allows for 1 month per year of excused absence (vacation, leave, etc). ABIM defines 1 month as being 5 weeks or 35 days. Attendance at conferences our courses as well as time spent for job interviews are considered essential for training and do not count towards this total. If training goals and objectives have been met and the fellow has exceeded this time due to excused leave, an additional month may be excused using the ABIM "deficit in training" policy. If there are training items that have not been met (such as procedural volume) and/or if the total time away exceeds the ABIM allowance, training will have to be extended past June 30th.

For purposes of this calculation, vacation weeks taken will be counted as 7 days, personal and interview days will be 1 day each.

Examples:

- A fellow takes 8 weeks of maternity leave plus an additional 4 weeks of vacation during their third year. The fellow has taken 4 weeks of vacation the prior two years along with 3 personal days in year 1 and 2 personal days in year 2. In this case, the fellow will have taken 8x7d leave + 8x7d vacation or 112 days, plus 5 personal days for a total of 117 days. This is below the 140 days allowed by ABIM and training does not have to be extended provided other training requirements have been met by June 30th of the third year.

- A fellow takes 12 weeks of maternity leave plus an additional 4 weeks of vacation during their third year. The fellow has taken 5 personal days each year. In this case, the fellow will have taken 12x7d leave + 12x7d vacation + 3x5d personal days or 183 days. This exceeds the 140 days allowed by ABIM and training will have to be extended by 43 days.

- A fellow takes 7 weeks of caregiver leave in year 3. The fellow took 3 weeks of vacation in year 1, 4 weeks in year 2 and 4 weeks in year three. The fellow took 5 personal days in year 1, 3 in year 2, and 5 in year three. In this case, the fellow will have taken 49 days of leave, 77 days of vacation, 13 personal days for a total of 139 days. This is under the allowable 140 days by ABIM and training does not have to extended provided other training requirements have been met by June 30th of third year.

ABIM policy is described below:

- https://www.abim.org/certification/policies/special-training-policies

- Finn KM, Zaas AK, McDonald FS, Melfe M, Kisielewski M, Willett LL. Misinterpretation of the American Board of Internal Medicine Leave Policies for Resident Physicians Around Parental Leave. Ann Intern Med. 2020 Apr 21;172(8):570-572. doi: 10.7326/M19-2490

UVMMC GME Policies

For details on official GME policies including dispute resolution, discipline/dismissal, moonlighting see the appendix. Updated information can be found at: https://www.uvmhealth.org/gme/pages/applying/gme-policy-and-procedure-manual.aspx

Moonlighting policy

The PCCM Unit follows the Moonlighting Policy Outlined by the UVMMC GME Policy and Procedure Manual. In general, moonlighting is discouraged. A proposal for moonlighting must be approved by the Program Director and the Research Mentor. It is the individual fellow's responsibility to ensure proper licensing, work authorization and malpractice coverage for such activities. All moonlighting hours must be included in the ACGME duty hour limits. Moonlighting may only be performed during the 2nd and 3rd years of fellowship during non-clinical rotations. Moonlighting may not interfere with any clinical, didactic or research responsibilities. All moonlighting hours must be reported in writing to the Program Administrator (Kelly Thompson). The fellow's performance will be monitored during moonlighting periods and permission to moonlight may be withdrawn if such activity is interfering with the fellow's responsibilities and performance in the fellowship training program.

WELLBEING POLICY

Fellow well-being is a high priority of our program, our department, the GME office, and the hospital. Relevant AGME requirements are outlined in section VI.C of the program requirements for graduate medical education in pulmonary disease and critical care medicine. The ACGME program requirements state that:

> *Psychological, emotional, and physical well-being are critical in the development of the competent, caring, and resilient physician and require proactive attention to life inside and outside of medicine. Well-being requires that physicians retain the joy in medicine while managing their own real life stresses. Self-care and responsibility to support other members of the health care team are important components of professionalism; they are also skills that must be modeled, learned, and nurtured in the context of other aspects of fellowship training.*
>
> *Fellows and faculty members are at risk for burnout and depression. Programs, in partnership with their Sponsoring Institutions, have the same responsibility to address well-being as other aspects of resident competence. Physicians and all members of the health care team share responsibility for the well-being of each other. For example, a culture which encourages covering for colleagues after an illness without the expectation of reciprocity reflects the ideal of professionalism. A positive culture in a clinical learning environment models constructive behaviors, and prepares fellows with the skills and attitudes needed to thrive throughout their careers.*

Towards these ends, the following values and policies are in place to promote and ensure fellow well-being in our program:

1. Access to medical and psychological/psychiatric services

We strongly encourage fellows to obtain a Primary Care Provider on arrival in Vermont for fellowship. This physician/practice will be the home from which they obtain maintenance and episodic healthcare throughout their training. For mental health treatment, we recommend consultation with the fellow's PCP or the UVMMC Employee Family and Assistance Program (EFAP) so that the initial consultation can be prompt and timely. If fellows feel comfortable alerting the program director or program administrator, they can also facilitate the process.

While fellows are encouraged to schedule routine health visits when they are not on inpatient clinical services, they are permitted to attend medical and mental health visits during the day if the need arises. Coverage on the service will generally be done by the supervising attending physician.

2. Clinical workload

Fellow workload must allow a balance between providing an immersive experience in clinical work with the time necessary to reflect on, read about, and process those experiences. Work hours and work experience are monitored by the program director and program evaluation committee (see separate work hours policy). The fellowship program enforces work hour restrictions as outlined by the ACGME and violations of this are investigated.

Fellows have access to quiet office space in the hospital and the fellowship academic office. Additionally, they have access to a quiet call room with a clean bed for use when fatigued. The program will provide transportation for fellows who are fatigued and unable to safely drive home.

3. Monitoring well-being. Fellows meet with the program director formally twice per year with additional meetings with clinical mentors and research/career mentors throughout the year. Prior to each formal semi-annual evaluation, fellows will complete a self-assessment which includes the 7-question Physician Well-Being Index (PWBI). The PWBI is a validated tool that can identify physicians with low mental quality of life, high fatigue, and suicidal ideation. The seven questions included on the self-assessment are:

1. Have you felt burned out from your work?
2. Have you worried that your work is hardening you emotionally?
3. Have you often been bothered by feeling down, depressed, or hopeless?
4. Have you fallen asleep while stopped in traffic driving?
5. Have you felt that all things you had to do were piling up so high that you could not overcome them?
6. Have you been bothered by emotional problems (such as feeling anxious, depressed, or irritable)?
7. Has your physical health interfered with your ability to do your daily work at home and/or away from home?

For fellow with a PWBI of 4 or greater, additional intervention will be coordinated with the program director. Fellows are encouraged to report concerns for colleagues' well-being including signs of depression, substance abuse, suicidal ideation, or potential for violence. Well-being items are additionally assessed annually by the ACMGE with results reviewed with the fellows and program leadership.

4. Use of personal and vacation time

To refresh and care for one's wellbeing outside of work, there must be adequate time to spend with family and friends, and to attend to home responsibilities. Vacation and time away (per limits of the hospital/GME) is encouraged and supported.

They are excused from clinical service as well for personal illness, fatigue, and family emergencies. For unanticipated absences from clinical service, coverage will be provided by the attending physician without expectation of identifying another fellow for coverage. For anticipated absences of 2 or more days, the clinical schedule may be adjusted to facilitate continuity of patient care. An extended leave policy allows for parental leave; per ABMS policy, fellows may take up to 12 weeks of leave during training without having to extend their training (if all goals/objectives and competencies are met). Extended leave will be scheduled in place of research time.

Evaluation

Fellows are evaluated according to the ACGME core competencies and their associated milestones. Evaluations are performed by each attending at the end of a rotation. Evaluations of clinic performance are conducted quarterly. Evaluations that incorporate additional staff input (360-evaluations) are conducted annually.

These evaluations are submitted and collated electronically. The evaluations are reviewed semi-annually by the Clinical Competency Committee. This committee synthesizes the information and generates a summary score on each of the ACGME milestones. The results are available to the fellow and are reviewed at each semi-annual meeting with the program director.

In addition, all fellows have the opportunity to evaluate each attending on a monthly basis.

Annual evaluations of the program are conducted with both the faculty and trainees. The results of these annual program evaluations are discussed at a division meeting that is conducted generally in late May or early June.

ACGME Milestones for Subspecialty Training (Milestones 2.0)

Patient care
PC1: History and physical examination
PC2: Disease management in critical care
PC3: Disease management in pulmonary medicine
PC4: Pre-procedure assessment
PC5: Procedures (invasive and non-invasive)

Medical Knowledge
MK1: Clinical reasoning
MK2: Scientific knowledge of disease and therapeutics

Systems Based Practice
SBP1: Patient safety and quality improvement
SBP2: Coordination and transitions of care
SBP3: Population health
SBP4: Physician role in the health care system

Problem-Based Learning and Improvement
PBLI1: Evidence based and informed practice
PBLI2: Reflective practice and commitment to personal growth

Professionalism
PROF1: Professional behavior and ethical principles
PROF2: Accountability
PROF3: Well-being and resiliency

Interpersonal and Communications Skills
ICS1: Patient- and family-centered communication
ICS2: Interprofessional and team communication
ICS3: Communication within health care systems
ICS4: Complex communication around serious illness

https://www.acgme.org/globalassets/pdfs/milestones/pulmonarycriticalcaremilestones2.0.pdf

Procedural competency

Fellows in Pulmonary and Critical Care Medicine are expected to be competent to do the following procedures independently without the supervising physician being physically present at the time the procedure is done:

- Lumbar Puncture
- Thoracentesis (This will include proper use of ultrasound for guidance)
- Paracentesis
- Arterial Line Placement
- Central Line Placement (This will include proper use of ultrasound for guidance of catheters placed in the IJ position)
- Pulmonary Artery Catheter Insertion
- Intubation of the airway
- Critical Care Ultrasound

Documentation of competency from the Director of the Internal Medicine Residency Program that the fellow graduated from will be accepted for the following procedures:

- Lumbar Puncture
- Thoracentesis (This will include proper use of ultrasound for guidance)
- Paracentesis

For the following procedures, five of each procedures will need to be supervised and evaluated by UVM PCCM faculty:

- Arterial line placement
- Central line placement (including IJ, subclavian, and femoral locations, including proper use of ultrasound for guidance of catheters placed in the IJ position)
- PA catheter insertion & waveform interpretation
- Intubation of the airway
- Critical care ultrasound
- Fiberoptic bronchoscopy with endobronchial/transbronchial biopsies, lavage, brushing
- Tube thoracostomy
- Endobronchial ultrasound

Evaluation and Feedback:

Procedure evaluation forms for all supervised procedures will be kept on file. Fellows are responsible for maintaining procedure logs that document all procedures. These documents will be reviewed in annual meetings with the Program Director.

Clinical rotations

Pulmonary Continuity Clinic (weekly)

Goal

To provide education and training in the care of ambulatory patients with pulmonary diseases.

Objectives

To learn the evaluation and management of new outpatient consults. This will include learning the longitudinal management of patients with a variety of pulmonary diseases as the patient's primary pulmonary physician. In addition, fellows will learn skills in communication with referring physicians as a subspecialty consultant.

These goals and objectives will be based on the 6 ACGME competencies, as specified for each competency below:

Patient Care: Fellows will learn how to take care of ambulatory patients with a wide variety of pulmonary disorders, especially in the outpatient setting. In year 2 of training, fellows will develop increasing responsibility for patient care, as evidenced by more independent interpretation of data, performance of procedures, decision making, and communication with patients, their families and other health care professionals involved in the care of the patient. In year 3 of training, fellows will be functioning near or at the level of the attending in terms of overall care of the patient, while still under the supervision of the faculty.

Medical Knowledge: Fellows will develop a basic knowledge of the pathophysiology of pulmonary diseases and the current treatment approaches to these diseases. In year 2 of training, fellows will acquire more advanced knowledge of pathophysiology and disease states, and understand and utilize resources to gain additional knowledge. In year 3, fellows will be fully versed in sufficient knowledge of pulmonary medicine, especially as it pertains to outpatient medicine, that they may be prepared to sit for their board examinations.

Professionalism: Fellows will interact with their patients and with the clinic support staff in a professional and polite manner. They will respect patient privacy and autonomy and be sensitive to the diversity of patients' backgrounds. In the second year of training, fellows will be expected to improve their professionalism by acquiring team leadership skills and the ability to manage conflict resolution. They will also develop time management skills, especially to assist them in balancing their clinical duties and their research activities. By the third year the fellows will have developed an independent professional style.

Communication and Interpersonal Skills: Fellows will communicate clearly and completely with patients and clinic support staff regarding all aspects of patient care. They will also learn how to appropriately communicate by dictated letter and telephone with referring physicians regarding their assessment and advise regarding the patient. In the second year, fellows will develop increasing experience and skill at teaching colleagues through effective communication and delivery of useful information. In the third year of training, fellows will be adept at efficient and complete communication with colleagues and patients, especially as this pertains to outpatient medicine.

Practice-Based Learning: Fellows will develop a working knowledge of the current standards of care of patients based on guidelines and review of the medical literature. They will participate in Quality Assurance projects that seek to optimize and improve patient care. In year 2, fellows will increasingly identify and acknowledge their own limitations in knowledge and skills and work towards improving them. In year 3, fellows will continue to hone their skills in reading and interpreting the medical literature, advance their learning through participating in seminars and conferences, and improve the quality, efficiency and cost-effectiveness of care through participation in quality assurance programs.

System-based Practice: Fellows will learn to use the medical information systems available to them in clinic, including the electronic medical record (PRISM), and radiology systems, and ultimately the electronic medical record (PRISM) as it becomes implemented in the clinic. They will also learn about other systems available to assist and participate the care of their patients, such as social work services, respiratory therapy, visiting nurses, home oxygen companies and hospice services, when appropriate. In year 2, fellows will improve their skills at use of consultative services, as well as awareness and implementation of cost-effective health care strategies. In year 3, fellows will be fully aware of and gain further experience in utilizing the health care related services and resources available to them to provide the most cost-effective and high quality care of their patients in the outpatient setting.

Educational Experience

Fellows will attend a weekly "Fellow's Clinic" during their entire fellowship. This clinic provides the fellow with the opportunity to evaluate new outpatient consults, to see patients following discharge from the hospital, and to see patients who require continued follow-up over an extended period of time as their primary pulmonary physician.

Each patient will be discussed with the assigned pulmonary teaching attending. The discussion will provide direction in developing differential diagnoses, directing patient management, and illustrating educational points. In addition, it is expected that fellows will do outside reading relevant to the patient's problems. A prepared log of the patients each fellow sees will be kept by the fellow and organized by problem category.

Fellows will be expected to present cases at the monthly outpatient case conference as

assigned.

Fellows will assume increasing responsibility as they progress from the first to the second to the third year of fellowship for decision making and follow-up regarding the care of their patients in clinic, under attending supervision. First year fellows will only dictate follow-up notes for the first 6 months, but by the second 6 months they will be dictating all notes.

Evaluation and Feedback

Fellow presentations will be critiqued informally by faculty members present at the time of presentation. This will include feedback on content and presentation. Written evaluation will occur biannually, in January and June, by the faculty members assigned to the clinics. Also on an annual basis, the trainees will provide written evaluation of faculty assigned to their clinic. Annually, the program director will formally review this educational program with the fellows and the faculty. Fellows will be expected to submit outpatient logs at this evaluation.

Fellows will be formally evaluated for Pulmonary Consultation Skills (see Section 3 - Evaluation Process) at the end of the first year of training in the outpatient clinic. This will be conducted by a designated faculty member.

Fellows will be evaluated with respect to the 6 competencies using tools appropriate to the clinic, as shown in the table of tools. Attendings will meet with fellows at the end of January and June to review the evaluation.

General Guidelines

The fellows' clinic occurs one half day per week at the Ambulatory Care Center, 5th Floor, University of Vermont Medical Center. Fellows are expected to attend this clinic above all other responsibilities unless on vacation, attending a meeting or the clinic has been cancelled. It is the fellows' responsibility to coordinate their clinic and communicate with the office staff. Each fellow will see 1-2 new patients and 3-5 follow-up patients per clinic. The assigned teaching attending will review history and physical exam findings with the fellow. The fellow will then finalize testing and treatment plans with the patient. Internal action sheets provided with each patient will coordinate plans with the clinic staff. The fellows are expected to follow up on all aspects of patient care including tests and communication with referring physicians in a timely fashion, and to communicate the results and care plan decisions with the teaching attending

One fellow will be assigned to read the daily PFT's for the outpatient clinic. This will be reviewed with an assigned attending. All of the fellows are encouraged to participate in the PFT review exercise.

Forms for documenting new patient and follow-up visits will be attached to each chart. Fellows are responsible for documentation as it applies to their patients. Current institutional documentation requirements necessitate that the attending physician dictates a note to the referring physician as well as the chart record.

Some patients will require diagnostic bronchoscopies or thoracenteses/pleural biopsies. These must be scheduled in advance and performed with an attending physician. The secretarial staff can assist fellows in scheduling these procedures. It is the responsibility of the fellow to assist in coordinating these procedures.

Medical Intensive Care Unit (MICU) Rotation

Goal

To provide training and education in the care and management of critically ill medical patients.

Objectives

To provide direct, hands-on experience in caring for critically ill patients. To provide education and experience in performing and supervising procedures necessary for the practice of critical care medicine. To provide experience and knowledge in managing an intensive care unit.

These goals and objectives will be based on the 6 ACGME competencies, as specified for each competency below:

Patient Care: Fellows will provide compassionate and appropriate care of patients with critical illness or consulted upon because of acute deterioration in clinical stability or status. They will become adept at all basic invasive procedures required in the care of the critically ill patient, including, but not limited to central venous access, arterial blood monitoring, pulmonary artery catheter placement and data interpretation, intracranial pressure monitoring, mechanical ventilation, thoracentesis, paracentesis, lumbar puncture and chest tube insertion. In year 2 of training, fellows will develop increasing responsibility for patient care, as evidenced by more independent interpretation of data, performance of procedures, decision making, running rounds, and communication with patients, their families and other health care professionals involved in the care of the patient. In year 3 of training, fellows will be functioning near or at the level of the attending in terms of overall care of the patient, while still under the supervision of the faculty.

Medical Knowledge: Fellows will develop a sound knowledge of the basic physiological principles that underlie critical illness. They will understand the appropriate work-up and management of a wide variety of diseases that result in critical illness. They will learn about diagnostic testing, critical care monitoring, including troubleshooting of mechanical ventilatory and pressure monitoring systems, and critical care therapeutics, both pharmaceutical and non-pharmaceutical (e.g., mechanical ventilation, IABP and other devices). They will understand, in particular, the appropriate role of subspecialty consultation. Fellows will also learn about end of life issues and gain experience in working with psychiatrists, social workers, palliative care specialists and the hospice team. Fellows will learn about caring not only for the critically ill patient but also supporting their family at the time of illness. In year 2 of training, fellows will acquire more advanced knowledge of pathophysiology and disease states, and understand and utilize resources to gain additional knowledge. In year 3, fellows will be fully versed in sufficient knowledge of pulmonary and critical care medicine that they may be prepared to sit for their board examinations.

Professionalism: Fellows will interact with their patients and with the hospital support staff and other colleagues in a professional and polite manner. They will respect patient privacy

and autonomy and be sensitive to the diversity of patients' backgrounds. They will be particularly sensitive to the needs of their patients' family and loved ones. In the second year of training, fellows will be expected to improve their professionalism by acquiring team leadership skills and the ability to manage conflict resolution. They will also develop time management skills, especially to assist them in balancing their clinical duties and their research activities. By the third year the fellows will have developed an independent professional style

Communication and Interpersonal Skills: Fellows will communicate clearly and completely with patients, families and hospital support staff regarding all aspects of patient care. They will also learn how to appropriately communicate by dictated letter and telephone with referring physicians regarding their assessment and advise regarding the patient. . In the second year, fellows will develop increasing experience and skill at teaching colleagues through effective communication and delivery of useful information. In the third year of training, fellows will be adept at efficient and complete communication with colleagues and patients, especially as this pertains to in-hospital care of patients.

Practice-Based Learning: Fellows will develop a working knowledge of the current standards of care of patients based on guidelines and review of the medical literature. They will participate in Quality Assurance projects that seek to optimize and improve patient care. In year 2, fellows will increasingly identify and acknowledge their own limitations in knowledge and skills and work towards improving them. In year 3, fellows will continue to hone their skills in reading and interpreting the medical literature, advance their learning through participating in seminars and conferences, and improve the quality, efficiency and cost-effectiveness of care through participation in quality assurance programs.

System-based Practice: Fellows will learn to use the medical information systems available to them in the hospital, including the electronic medical record system (PRISM) and radiology systems. They will learn how to effectively use their subspecialty colleagues who provide consultation services. They will also learn about other systems available to assist and participate the care of their patients, such as social work services, respiratory therapy, visiting nurses, home oxygen companies and hospice services, when appropriate. In year 2, fellows will improve their skills at use of consultative services, as well as awareness and implementation of cost-effective health care strategies. In year 3, fellows will be fully aware of and gain further experience in utilizing the health care related services and resources available to them to provide the most cost-effective and high quality care of their patients in the hospital setting.

Educational Experience

Fellows will rotate on the MICU service as outlined in the general schedule. The Medical Intensive Care Unit Fellows will actively participate in all aspects of the care of patients on the medical ICU service. This should include but is not limited to medical management, procedures, family meetings, communication with referring physicians, and bed management issues. All admissions will be seen by the fellow and subsequently discussed

with the attending physician. Fellows will document a complete history and physical examination in the hospital chart for each new admission. As training advances, fellows will take on increasing responsibilities for patient care in the MICU.

Fellows in their first year of training will attend 2 MICU Quality Assurance Committee meetings. In the second year, fellows will develop a QA project to be completed by the third year of training. Fellows will present the results to the MICU QA committee and to the Pulmonary/Critical Care Faculty.

In the third year of training, fellows will complete a one month rotation as the "Acting Attending" for the MICU service. The fellow will have complete responsibility for the MICU management under the guidance of an attending physician. This will serve the specific goal of preparing fellows for their final step beyond fellowship training and into a practicing physician.

Evaluation and Feedback

Fellows will be informally critiqued on case management and performance of invasive procedures while rotating on the MICU service.

Fellows will be formally evaluated each month. Fellows will evaluate their educational experience on the MICU rotation and the attending faculty each month.

The program director will formally review this educational program semiannually with the fellows and the faculty.

Fellows will be evaluated with respect to the 6 competencies using tools appropriate to the MICU rotation, as shown in the table of tools. Attendings will meet with fellows at the end of the rotation to review the evaluation.

General Guidelines

McClure 4 intensive care is a combined medical and cardiac intensive care unit. The 21-bed unit is under the joint direction of a cardiology and a pulmonary/critical care faculty member. The key components to the health care team is the staff of nurses, respiratory therapists and others who are highly trained and experienced in ICU care. The unit is committed to the team approach to ICU care. Communication is of utmost importance.

Admission Policy – MICU - All admissions to the MICU (regardless of origin) must be approved by the MICU attending physician. Emergency admissions from the regular floor should be seen by the senior resident prior to transfer. A call schedule for the MICU service is listed on the unit and is known to the hospital operator. The charge nurse must be informed by the senior resident or fellow of all patient admissions and transfers.

Daily Rounds, Responsibilities, and Codes - Formal rounds begin at 9 AM. All Fellows are expected to have evaluated their patients and collected pertinent data prior to the beginning of rounds. Fellows are expected to attend morning check-in rounds at 7:00 AM and to have

done the same pre-round evaluation and to supervise the residents in initiating daily care plans and weaning from mechanical ventilation. X-rays will be reviewed in the Radiology Department as part of attending rounds from 9 – 11:30 AM. Daily progress notes should be completed in a timely fashion. Fellows will round with the social work team at 8:30 am.

Afternoon rounds are conducted at 4PM daily. Evening sign out will occur at 7:00 pm daily. Follow up on daily progress and diagnostic tests are reported at this time. These rounds are an important part of effective ICU communication and planning for the on-call team.

Residents and fellows are expected to attend all critical care conferences. Residents and fellows are excused for any continuity clinic duties related to the training program.

The MICU team also is responsible for directing in house code-calls. The senior resident should be in charge of running the code with the assistance of the fellow. Fellows should assume responsibility for airway management at all codes.

The resident physicians write all orders. Transfer and discharge orders are written by the MICU service and should be written before 9 AM. Transfer notes (admission and discharge) for MICU patients are the responsibility of the respective services.

Procedures - Procedures will be performed and documented as outlined in the Procedure Training and Documentation section. Fellows are expected to actively supervise and teach residents in procedure training.

Conferences -Fellows are expected to attend the weekly critical care conference. This conference provides the didactic teaching curriculum as outlined above. In addition fellows will be expected to attend and participate in the monthly Pulmonary and Critical Care Journal Club. Fellows will also be expected to assist with didactic teaching conferences for residents rotating on the critical care service. Fellows are expected to attend the Department of Medicine Morbidity and Mortality conferences one Friday a month at 9AM when MICU patients are presented. The Chief Medical Resident will notify the Fellows of the date of this conference.

Pulmonary Consult Rotation

Goal

To teach fellows basic and advanced skills in diagnosing and managing hospitalized patients with simple and complex pulmonary illnesses.

Objectives

To assist fellows in improving their ability to examine inpatients with pulmonary disorders at the bedside. To teach fellows to effectively communicate clinical and administrative information to colleagues, nurses, and students. To teach fellows to coordinate and integrate information derived from pulmonary function testing, radiographic studies, bronchoscopy, and other pulmonary and non-pulmonary tests in assessing individual pulmonary inpatients. To assist fellows in enhancing skills in communicating with medical professionals, and with patients and their families through verbal and written communication. To teach fellows to administer an inpatient consultation service that provides effective, appropriate and timely service in a teaching hospital setting.

These goals and objectives will be based on the 6 ACGME competencies, as specified for each competency below:

Patient Care: Fellows will provide compassionate and appropriate care of inpatients with pulmonary disease or referred for consultation because of respiratory related disorders. In year 2 of training, fellows will develop increasing responsibility for patient care, as evidenced by more independent interpretation of data, performance of procedures, decision making, and communication with patients, their families and other health care professionals involved in the care of the patient. In year 3 of training, fellows will be functioning near or at the level of the attending in terms of overall care of the patient, while still under the supervision of the faculty.

Medical Knowledge: Fellows will develop a sound knowledge of the basic physiological principles that underlie pulmonary disease. They will learn the appropriate work-up and management of a wide variety of pulmonary disorders, especially in the inpatient setting. This includes specialized knowledge and exposure in the areas of history taking, physical exam, imaging and pathologic analysis of cells and tissues. In year 2 of training, fellows will acquire more advanced knowledge of pathophysiology and disease states, and understand and utilize resources to gain additional knowledge. In year 3, fellows will be fully versed in sufficient knowledge of pulmonary and critical care medicine that they may be prepared to sit for their board examinations.

Professionalism: Fellows will interact with their patients and with the hospital support staff and other colleagues in a professional and polite manner. They will respect patient privacy and autonomy and be sensitive to the diversity of patients' backgrounds. In the second year of training, fellows will be expected to improve their professionalism by acquiring team leadership skills and the ability to manage conflict resolution. They will also develop time

management skills, especially to assist them in balancing their clinical duties and their research activities. By the third year the fellows will have developed an independent professional style.

Communication and Interpersonal Skills: Fellows will communicate clearly and completely with patients and hospital support staff regarding all aspects of patient care. They will also learn how to appropriately communicate by dictated letter and telephone with referring physicians regarding their assessment and advise regarding the patient. In the second year, fellows will develop increasing experience and skill at teaching colleagues through effective communication and delivery of useful information. In the third year of training, fellows will be adept at efficient and complete communication with colleagues and patients, especially as this pertains to in-hospital care of patients.

Practice-Based Learning: Fellows will develop a working knowledge of the current standards of care of patients based on guidelines and review of the medical literature. They will participate in Quality Assurance projects that seek to optimize and improve patient care. In year 2, fellows will increasingly identify and acknowledge their own limitations in knowledge and skills and work towards improving them. In year 3, fellows will continue to hone their skills in reading and interpreting the medical literature, advance their learning through participating in seminars and conferences, and improve the quality, efficiency and cost-effectiveness of care through participation in quality assurance programs.

System-based Practice: Fellows will learn to use the medical information systems available to them in clinic, including the electronic medical record (Epic), and radiology systems, and ultimately the electronic medical record as it becomes available in the clinic. They will also learn about other systems available to assist and participate the care of their patients, such as social work services, respiratory therapy, visiting nurses, home oxygen companies and hospice services, when appropriate. In year 2, fellows will improve their skills at use of consultative services, as well as awareness and implementation of cost-effective health care strategies. In year 3, fellows will be fully aware of and gain further experience in utilizing the health care related services and resources available to them to provide the most cost-effective and high quality care of their patients in the hospital setting.

Educational Experience

Bedside Teaching -Fellows will attend rounds daily with the attending teaching physician and visit selected patients.

Fellows will visit inpatients in a timely fashion for new consultation and daily (or as frequently as appropriate) thereafter. At each visit, fellows will carry out an appropriately focused bedside exam and review relevant laboratory data, consultations, and radiographic information.

Didactic Sessions - The fellow assigned to the pulmonary consultation service will attend routinely scheduled didactic session including case conferences, VLC meetings, grand

rounds, journal club, and textbook review sessions. Fellows will complete appropriate readings regarding key inpatients in textbooks, journals, and other scholarly sources.

It can be anticipated that each fellow will consult on at least 20-40 new patients during each month on the clinical consultation service.

Fellows will assume increasing responsibility for patient care as they become more senior in their training. By their third year, fellows will be functioning independently as a consultant, interacting directly with housestaff and attendings, performing procedures, and being involved in interdisciplinary care of their patients.

Evaluation and Feedback

Written evaluation will be completed by the attending physician(s) at the end of each rotation on the consult service. The fellowship program director will provide feedback to the fellows regarding their performances in the scheduled semi-annual meeting.
The trainees will provide written evaluation of the attending and the rotation at the end of each month's rotation.

Concerns or issues regarding fellows' performance that are raised by medical staff outside the pulmonary training program will be brought to the attention of the program director who will address them individually with the fellow.

Areas for improvement can be addition of additional evaluation session with fellows at 2 weeks into the inpatient rotation to allow feedback and time for change, if needed.

Fellows will be evaluated with respect to the 6 competencies using tools appropriate to the Consult rotation, as shown in the table of tools.

Procedure Rotation

Goal
Develop and demonstrate skill in performing bronchoscopic and pleural procedures.

Objectives
Perform bronchoscopic and pleural procedures including the preprocedure evaluation and postprocedure follow-up.

These goals and objectives will be based on the 6 ACGME competencies, as specified for each competency below:

Patient Care: Fellows will deliver appropriate and compassionate care to patients referred for bronchoscopic and outpatient pleural procedures. They will perform appropriate preprocedure evaluation to ensure the procedure is appropriate for the patient and will discuss procedure rationale, risks, benefits with the patient. The fellows will demonstrate skill in conventional diagnostic bronchoscopy (including examination, lavage, endobronchial and transbronchial biopsy) that will allow for independent practice. They will demonstrate skill in endobronchial ultrasound bronchoscopy (including transbronchial needle aspiration) that will allow for independent practice. Fellows will recognize and manage common procedural complications including hypoxemia, pneumothorax, bleeding. They will have experience in robotic bronchoscopy and interventional pulmonary procedures. They will have experience with pleural procedures that will allow for independent practice in performing thoracentesis and tube thoracostomy. Fellows will generally have a more limited role in the procedures at the start of training with increasing responsibility as their skill allows.

Medical Knowledge: Fellows will be able to describe the rationale for bronchoscopic procedures including the literature supporting their utility in different clinical scenarios. They will have an understanding of the risks of the procedures. They will demonstrate knowledge of lung cancer staging and the role of bronchoscopy in the staging process. Fellows will learn the fundamentals of linear and radial endobronchial ultrasound.

Professionalism: Fellows will interact with their patients and with the hospital support staff and other colleagues in a professional and polite manner. They will respect patient privacy and autonomy and be sensitive to the diversity of patients' backgrounds. They will be particularly sensitive to the needs of their patients' family and loved ones. In the second year of training, fellows will be expected to improve their professionalism by acquiring team leadership skills and the ability to manage conflict resolution. They will also develop time management skills, especially to assist them in balancing their clinical duties and their research activities. By the third year the fellows will have developed an independent professional style

Communication and Interpersonal Skills: Fellows will communicate clearly and completely with patients, families and hospital support staff regarding all aspects of patient care. They

will also learn how to appropriately communicate by dictated letter and telephone with referring physicians regarding their assessment and advise regarding the patient. . In the second year, fellows will develop increasing experience and skill at teaching colleagues through effective communication and delivery of useful information. In the third year of training, fellows will be adept at efficient and complete communication with colleagues and patients, especially as this pertains to in-hospital care of patients.

Practice-Based Learning: Fellows will develop a working knowledge of the current standards of care of patients based on guidelines and review of the medical literature. In year 2, fellows will increasingly identify and acknowledge their own limitations in knowledge and skills and work towards improving them. In year 3, fellows will continue to hone their skills in reading and interpreting the medical literature, advance their learning through participating in seminars and conferences, and improve the quality, efficiency and cost-effectiveness of care.

System-based Practice: Fellows will learn to use the medical information systems available to them in the hospital, including the electronic medical record system (Epic) and radiology systems. They will learn how the Operating Room operates including the role of nurses, anesthesiologists, respiratory therapists, cytopathology, and support staff. In year 2 and 3, they will be able to effectively navigate the system to efficiently schedule and perform bronchoscopic procedures with and without anesthesia support.

Educational Experience

Fellows will participate in all diagnostic, advanced (including endobronchial ultrasound, robotic) bronchoscopy, and most interventional procedures occurring outside of the MICU unless occurring during their continuity clinic. They will be responsible for arranging all non-interventional procedures. Faculty will be present for all cases. In year 1 they will have increasing responsibility for the conduct of the procedure as their skills allow. In years 2 and 3, fellows will perform diagnostic and EBUS procedures as the primary operator. Fellows will see and evaluate patients in the Interventional Pulmonary and/or Lung Cancer Multidisciplinary clinics who may require bronchoscopy. Fellows will staff cardiopulmonary exercise studies that occur in the PFT lab. Fellows will evaluate patients and perform diagnostic and therapeutic thoracentesis in the pleural procedures clinic (when available).

The typical weekly schedule is below:

	Monday*	Tuesday*	Wednesday*	Thursday*	Friday

AM (7a-12p)	CPET staffing IP clinic	IP procedures	Pleural clinic (when available)	IP procedures (when available)	Bronchoscopy day
PM (1p-5p+)	Lung MDC clinic	IP procedures (varies)	Continuity Clinic		Bronchoscopy day

*any diagnostic or EBUS bronchoscopies outside of the MICU/CV-ICU will take priority over other responsibilities (except continuity clinic)
Responsibilities (in order of priority):

1) Coordinate and perform all non-MICU diagnostic and EBUS bronchoscopies
2) Assist IP procedures
3) Staff CPETs in PFT lab (consult fellow to staff CPET if procedure fellow is unavailable)
4) Perform video laryngoscopies in PFT lab
5) Participate in thoracic tumor clinics
6) Participate in pleural clinic

Evaluation and Feedback

- Fellows will receive feedback on their procedures using standardize evaluation forms
- Fellows will receive feedback on their clinic performance at the end of the rotation.
- The trainees will provide written evaluation of the attending(s) involved.
- Concerns or issues regarding fellows' performance that are raised by medical staff outside the pulmonary training program will be brought to the attention of the program director who will address them individually with the fellow.

Surgical Intensive Care Unit (SICU) Rotation

Goals

To gain knowledge skills in the care of patients with a variety of surgical problems. To gain knowledge and skills in procedures unique to the care of SICU patients. To gain knowledge of the unique management needs of surgical patients.

Objectives

The surgical intensive care unit cares for all critically ill surgical patients. This provides the trainee with an opportunity to become familiar with the care of a wide variety of surgical problems. Trainees will become experienced in the care and management of patients in the following areas: trauma, neurosurgery, general surgery, vascular surgery, and cardiothoracic surgery.

These goals and objectives will be based on the 6 ACGME competencies, as specified for each competency below. This rotation is required during the 1st, 2nd and 3rd years of training for a total of 3 months experience.

Patient Care: Fellows will provide compassionate and appropriate care of patients with critical illness or consulted upon because of acute deterioration in clinical stability or status. In the SICU, this will particularly pertain to patients with surgical issues, such as post-operative state, trauma. They will become adept at all basic invasive procedures required in the care of the critically ill patient, including, but not limited to central venous access, arterial blood monitoring, pulmonary artery catheter placement and data interpretation, intracranial pressure monitoring, mechanical ventilation, thoracentesis, paracentesis, lumbar puncture and chest tube insertion. In year 3 of training, fellows will develop increasing responsibility for patient care, as evidenced by more independent interpretation of data, performance of procedures, decision making, running rounds, teaching, and communication with patients, their families and other health care professionals involved in the care of the patient.

Medical Knowledge: Fellows will develop a sound knowledge of the basic physiological principles that underlie critical illness. They will understand the appropriate work-up and management of a wide variety of surgical conditions or diseases that result in critical illness. They will understand, in particular, the appropriate role of additional diagnostic testing (e.g. imaging) and subspecialty consultation. Fellows will also learn about end of life issues and gain experience in working with psychiatrists, social workers, palliative care specialists and the hospice team. Fellows will learn about caring not only for the critically ill patient but also supporting their family at the time of illness. In year 2 of training, fellows will acquire more advanced knowledge of pathophysiology and disease states, and understand and utilize resources to gain additional knowledge. In year 3, fellows will be fully versed in sufficient knowledge of surgical critical care in relation to pulmonary and critical care medicine that they may be prepared to sit for their board examinations.

Professionalism: Fellows will interact with their patients and with the hospital support staff and other colleagues in a professional and polite manner. They will respect patient privacy and autonomy and be sensitive to the diversity of patients' backgrounds. They will be particularly sensitive to the needs of their patients family and loved ones. In the second year of training, fellows will be expected to improve their professionalism by acquiring team leadership skills and the ability to manage conflict resolution. They will also develop time management skills, especially to assist them in balancing their clinical duties and their research activities. By the third year the fellows will have developed an independent professional style

Communication and Interpersonal Skills: Fellows will communicate clearly and completely with patients, families and hospital support staff regarding all aspects of patient care. They will also learn how to appropriately communicate by dictated letter and telephone with referring physicians regarding their assessment and advise regarding the patient. . In the second year, fellows will develop increasing experience and skill at teaching colleagues through effective communication and delivery of useful information. In the third year of training, fellows will be adept at efficient and complete communication with colleagues and patients, especially as this pertains to in-hospital care of patients.

Practice-Based Learning: Fellows will develop a working knowledge of the current standards of care of patients based on guidelines and review of the medical literature. They will participate in Quality Assurance projects that seek to optimize and improve patient care. In year 2, fellows will increasingly identify and acknowledge their own limitations in knowledge and skills and work towards improving them. In year 3, fellows will continue to hone their skills in reading and interpreting the medical literature, advance their learning through participating in seminars and conferences, and improve the quality, efficiency and cost-effectiveness of care through participation in quality assurance programs.

System-based Practice: Fellows will learn to use the medical information systems available to them in clinic, including the electronic medical record (PRISM) and radiology systems. They will learn how to effectively use their subspecialty colleagues who provide consultation services. They will also learn about other systems available to assist and participate the care of their patients, such as social work services, respiratory therapy, visiting nurses, home oxygen companies and hospice services, when appropriate. In year 2, fellows will improve their skills at use of consultative services, as well as awareness and implementation of cost-effective health care strategies. In year 3, fellows will be fully aware of and gain further experience in utilizing the health care related services and resources available to them to provide the most cost-effective and high quality care of their patients in the hospital setting.

Educational Experience

Experience will be accomplished by caring for SICU patients as a member of the Surgical Critical Care Service. Care of patients in the surgical intensive care unit is a collaborative effort between the surgical team and the critical care team. Pulmonary Critical Care Fellows will rotate as a member of the SICU team. The team is comprised of one senior and one

junior surgical resident and an attending physician. Fellows will rotate on the service for one month in each of their first, second and third years of training. Bedside teaching and procedure training will occur as part of the daily work rounds. Fellows should document all procedures performed in the SICU.

An informational packet regarding SICU policies and procedures will be distributed to each fellow prior to their first SICU rotation. Fellows are expected to follow these guidelines.

Fellows will assume increasing roles in teaching and supervising the surgical housestaff about critical care medicine as they progress from their second to third years.

General Guidelines

Fellows will attend all SICU teaching conferences as part of the SICU team. Fellows are expected to attend the ½ day Pulmonary continuity clinic as scheduled and the Thursday and Friday Pulmonary and Critical Care conferences. Night call will be taken as part of the regular Pulmonary and Critical Care Medicine call schedule. Fellows are encouraged to participate in the care of SICU patients as much as possible when on call for the Pulmonary and Critical Care Medicine division.

Evaluation and Feedback

Fellows will be informally critiqued on case management and performance of invasive procedures while rotating on the SICU service.

Fellows will be formally evaluated on a rotation basis by the surgical ICU attending physician. Fellows will evaluate their educational experience on the SICU rotation and the SICU attending(s) at the end of each rotation.

Fellows will be evaluated with respect to the 6 competencies using tools appropriate to the SICU rotation, as shown in the table of tools. Attendings will meet with fellows at the end of the rotation to review the evaluation.

The Vermont Regional Sleep Disorders Center (VRSDC) is a regional referral area for patients with sleep disorders from Vermont and upstate New York. The Center is composed of, neurologists, ENT surgeons, oral surgeons, general dentists, and clinical psychologists. The Center operates a testing facility which carries out a full range of diagnostic testing for patients with sleep disorders including laboratory polysomnograms, home sleep tests, overnight oximetry, and multiple sleep latency tests. Other laboratory and physiologic testing is available through the University of Vermont Medical Center laboratories and through the Pulmonary Function Laboratory. The core physicians in the Center oversee the management of the patients.

Sleep Clinic Rotation

Goals

Trainees will learn the physiology of sleep and ventilatory control during sleep, and the pathophysiology of the common sleep disorders. Trainees will become familiar with the diagnostic tests available for evaluating sleep, sleep-disordered breathing, and other sleep disorders. Trainees will learn to diagnose and manage patients with sleep disorders.

Objectives

Provide trainees with education in the physiology and pathophysiology of sleep and sleep disorders. Provide trainees with experience in carrying out and interpreting the diagnostic tests used to evaluate patients with sleep disorders. Provide trainees with clinical experience in the recognition, diagnosis, and treatment of sleep disorders.

These goals and objectives will be based on the 6 ACGME competencies, as specified for each competency below. This is a mandatory month-long rotation during the 1st year, and fellows may elect to spend additional time in the sleep clinic during the 2nd or 3rd year as part of their 6 additional months of half-day per week ambulatory care experience.

Patient Care: Fellows will learn how to take care of patients with sleep disorder breathing, with special attention to obstructive and central sleep apnea. In year 2 of training, fellows will develop increasing responsibility for patient care, as evidenced by more independent interpretation of data, performance of procedures, decision making, and communication with patients, their families and other health care professionals involved in the care of the patient. In year 3 of training, fellows will be functioning near or at the level of the attending in terms of overall care of the patient, while still under the supervision of the faculty.

Medical Knowledge: Fellows will develop a basic knowledge of the pathophysiology and treatment of sleep and sleep disordered breathing. The will learn how to acquire and read polysomnograms, as well as become familiar with the sleep latency test and other diagnostic modalities. They will learn about non-invasive ventilation with CPAP and BiPAP. In year 2 of training, fellows will acquire more advanced knowledge of pathophysiology and disease states, and understand and utilize resources to gain additional knowledge. In year 3, fellows will be fully versed in sufficient knowledge of pulmonary sleep medicine that they may be prepared to sit for their board examinations.

Professionalism: Fellows will interact with their patients and with the clinic support staff in a professional and polite manner. They will respect patient privacy and autonomy and be sensitive to the diversity of patients' backgrounds. In the second year of training, fellows will be expected to improve their professionalism by acquiring team leadership skills and the ability to manage conflict resolution. They will also develop time management skills, especially to assist them in balancing their clinical duties and their research activities. By the third year the fellows will have developed an independent professional style.

Communication and Interpersonal Skills: Fellows will communicate clearly and completely with patients and clinic support staff regarding all aspects of patient care. They will also learn how to appropriately communicate by dictated letter and telephone with referring physicians regarding their assessment and advise regarding the patient. In the second year, fellows will develop increasing experience and skill at teaching colleagues through effective communication and delivery of useful information. In the third year of training, fellows will be adept at efficient and complete communication with colleagues and patients, especially as this relates to the care of patients with sleep related breathing disorders.

Practice-Based Learning: Fellows will develop a working knowledge of the current standards of care of patients based on guidelines and review of the medical literature. They will participate in Quality Assurance projects that seek to optimize and improve patient care. In year 2, fellows will increasingly identify and acknowledge their own limitations in knowledge and skills and work towards improving them. In year 3, fellows will continue to hone their skills in reading and interpreting the medical literature, advance their learning through participating in seminars and conferences, and improve the quality, efficiency and cost-effectiveness of care through participation in quality assurance programs.

System-based Practice: Fellows will learn to use the medical information systems available to them in clinic, including the electronic medical record (PRISM), and radiology systems, and ultimately the electronic medical record as it comes online in the outpatient setting. They will also learn about other systems available to assist and participate the care of their patients, such as social work services, respiratory therapy, visiting nurses, and home oxygen companies. In year 2, fellows will improve their skills at use of consultative services, as well as awareness and implementation of cost-effective health care strategies. In year 3, fellows will be fully aware of and gain further experience in utilizing the health care related services and resources available to them to provide the most cost-effective and high quality care of their patients with sleep related breathing disorders.

Educational Experience

Pulmonary Fellows Seminars – Didactic Seminars will be conducted by the director the Sleep Laboratory, and will focus on the physiology of sleep, the physiology of ventilatory control during sleep, and the pathophysiology of various sleep disorders. Attendance is mandatory for all trainees.

Sleep Laboratory Experience - Trainees will gain experience with the following diagnostic tests: laboratory polysomnogram, home sleep tests, overnight oximetry, and multiple sleep latency tests. The Sleep Laboratory director will oversee this experience. Trainees will observe a minimum of two of each of the diagnostic tests as they are carried out. This includes participating in the scoring of the laboratory polysomnograms. Trainees will participate in the interpretation of a minimum of five of each of the diagnostic tests.

Sleep Disorders Clinic - Trainees will begin their experience with sleep disorders with a

concentrated experience for one month in the first year in order to familiarize them with the management of patients with sleep disorders.

Evaluation and Feedback

Evaluation of the level of preparedness of the fellows for the seminars and discussions will occur as part of the established quarterly evaluation by the faculty members. The Sleep Laboratory director will evaluate trainees on their knowledge base and clinical progress as part of the established quarterly evaluation of trainees. Trainees will document the tests that they observed and interpret, and report this to the program director at a semiannual evaluation in the first year.

Fellows will be evaluated with respect to the 6 competencies using tools appropriate to the Sleep clinic, as shown in the table of tools. Dr. Susan Dunning will meet with fellows at the end of the rotation to review the evaluation.

General Guidelines

Sleep Disorders training is coordinated by the Fellowship Program director and the Sleep Laboratory director. Fellows should contact the Sleep Laboratory director prior to beginning the rotation for specific details as to the time and location of the clinic

Pulmonary Subspecialty Rotation

Goal

To provide trainees with more in-depth educational experience in the evaluation and management of patients with selected pulmonary conditions.

Objectives

To learn the evaluation and management of patients presenting to subspecialty clinics. These subspecialty clinics include: lung nodule clinic, lung cancer multidisciplinary clinic, interventional pulmonary procedures, interstitial lung disease clinic, pulmonary hypertension clinic, cystic fibrosis clinic, and pulmonary rehabilitation.

These goals and objectives for each clinic will be based on the 6 ACGME competencies.

Shared competencies across clinics:

Professionalism: Fellows will interact with their patients and with the clinic support staff in a professional and polite manner. They will respect patient privacy and autonomy and be sensitive to the diversity of patients' backgrounds.

Communication and Interpersonal Skills: Fellows will communicate clearly and completely with patients and clinic support staff regarding all aspects of patient care. They will also learn how to appropriately communicate by dictated letter and telephone with referring physicians regarding their assessment and advise regarding the patient.

Practice-Based Learning: Fellows will develop a working knowledge of the current standards of care of patients based on guidelines and review of the medical literature.

System-based Practice: Fellows will learn to use the medical information systems available to them in clinic, including electronic medical record (PRISM), and radiology systems, and ultimately the electronic medical record as it comes online in the clinic. They will also learn about other systems available to assist and participate the care of their patients, such as social work services, respiratory therapy, visiting nurses, home oxygen companies and hospice services, when appropriate

Clinic specific objectives for patient care and medical knowledge

Cancer clinics (including lung nodule clinic, interventional pulmonary clinic):

Patient Care: Fellows will learn the initial approach to diagnosis and staging of patients with suspected thoracic malignancies, management of local complications of thoracic malignancies, as well as standard therapies for lung cancer based on stage. Fellows will learn diagnostic approach to patients with respiratory complications related to therapy for cancer at any site including lung. Fellows will learn the indications for endobronchial ultrasound bronchoscopy and will participate in bronchoscopic procedures. During procedures, they will demonstrate knowledge of airway and mediastinal anatomy and be

able to identify the IASLC specified lymph node stations. They will be able to perform 2-person transbronchial fine needle aspiration. In third year, they will demonstrate proficiency in performing single-operator transbronchial fine needle aspiration.

Medical Knowledge: Fellows will develop a basic knowledge of the pathophysiology of lung cancer, including the evaluation, staging and treatment of disease. In addition, the fellow will become familiar with the specific types of pathologic features associated with each type of cancer. The fellow will identify modalities for palliation of local complications of thoracic malignancies. The fellow will recognize cancer therapies that are associated with pulmonary complications.

Cystic Fibrosis Clinic

Patient Care: Fellows will learn how to take care of patients with CF, including its many pulmonary and non-pulmonary manifestations

Medical Knowledge: Fellows will develop a basic knowledge of the pathophysiology of CF, as well as transplant medicine as it relates to the assessment of patients for and care of patients after lung transplant.

Interstitial Lung Disease Clinic:

Patient Care: Fellows will learn the initial evaluation and management of patients referred with interstitial lung diseases and

Medical Knowledge: Fellows will develop a basic knowledge of the clinicoradiopathologic features of interstitial lung diseases delineated by the American Thoracic Society including idiopathic pulmonary fibrosis, connective tissue disease related interstitial lung disease, idiopathic nonspecific interstitial pneumonitis, cryptogenic organizing pneumonia, hypersensitivity pneumonitis. Fellows will learn the laboratory, radiographic, and pathologic evaluation of these diseases and be able to initiate and adjust management in these patients.

Pulmonary Rehabilitation:

Patient Care: Fellows will learn how to take care of patients referred to pulmonary rehab with a wide variety of pulmonary disorders. In year 2 of training, fellows will develop increasing responsibility for patient care, as evidenced by more independent interpretation of data, performance of procedures, decision making, and communication with patients, their families and other health care professionals involved in the care of the patient. In year 3 of training, fellows will be functioning near or at the level of the attending in terms of overall care of the patient, while still under the supervision of the faculty.

Medical Knowledge: Fellows will develop a basic knowledge of the pathophysiology of pulmonary diseases and the current treatment approaches to these diseases. They will also develop a working knowledge of the background and techniques used in pulmonary rehab

medicine.

Pulmonary Hypertension
Patient Care: Fellows will provide compassionate and appropriate care of patients with pulmonary hypertension.

Medical Knowledge: Fellows will develop a sound knowledge of the basic physiological principles that underlie pulmonary hypertension. They will become familiar with the WHO classification of pulmonary hypertension and with the recommended steps in diagnosis, evaluation and management.

Asthma Clinic
Patient Care: Fellows will provide compassionate and appropriate care of patients with severe asthma

Medical Knowledge: Fellows will develop a sound knowledge of the basic physiological principles that underlie asthma. They will become familiar with the GINA and NHLBI classification and with the recommended steps in diagnosis, evaluation and management including the use of biologic therapies.

Educational experience:
Fellows will be scheduled for 5 clinics in a 6-month period for a total of 10 clinics per year typically in years 2 and 3. This will be accounted for as a 2-week "Pulmonary Subspecialty" rotation on the block schedule. Fellows will notify the Program Director about their preferences in scheduling prior to the start of the academic year.

Responsible staff:

- IP clinic – Kinsey, Yurosko
- LMDC – Baalachandran, Garrison, Kinsey, Majumdar
- ILD – Gupta
- Pulmonary rehab – Menson, O'Shea
- Pulmonary hypertension – Antkowiak, Badlam
- CF – Teneback, Weintraub
- NIV – Baalachandran, Devarajan

General guidelines

During this rotation, fellows will have the opportunity to have more in-depth exposure to several subspecialty focus areas within pulmonary and critical care medicine. During the clinic days, trainees will generally be responsible for seeing new evaluations and follow-ups with significant educational value as discussed with the attending physician. On Mondays, the fellows will see new patient evaluations seeing either Dr. Garrison, Dr. Kinsey, or Dr.

Suratt. Fellows will see the patients independently and staff with the attending physician after formulating an assessment and plan; fellows will be responsible for completing documentation for the encounter.

Fellows should anticipate participating in any bronchoscopic procedures scheduled on patients they have evaluated during the procedure. EBUS procedures commonly occur on Tuesdays and Wednesdays. The trainee function as the EBUS fellow for the month and has the opportunity to participate in any IP and EBUS procedure as schedule and work hours permit. Fellows may also participate in any right heart catheterizations scheduled and performed by Dr. Antkowiak.

For the pulmonary rehabilitation days, the fellow will evaluate patients during rehabilitation sessions and will participate in patient education on selected days.

For thoracic radiology, the fellow will spend the afternoon with Dr. Gentchos, Dr. Klein, or Dr. Green in the thoracic reading room.

During this month, vacation can be taken for 1 week. Overnight call should be arranged to avoid missing a clinic multiple times during the month. If circumstances do not allow for a fellow to participate in a clinic, the fellow should notify the attending the day prior.

Evaluation

The fellows will receive a competency based summary evaluation reflecting clinical performance during the rotation. They will receive in-person formative feedback from attendings with whom they have been present for three or more clinics.

Training Pathways

Overview
Starting with the entering class of 2025-2026, training pathways will be available. Flexible training time in the second and third year provides dedicated time to allow for scholarly engagement in PCCM and tailors training needs to meet future career goals. Three training pathways are available: 1) Clinical Excellence, 2) Research, 3) Medical Education. Each pathway will have specific requirements and is overseen by a "pathway lead". Progress in each pathway will be reviewed every 6 months and the pathway lead will approve continued participation in the pathway. All trainees are expected to have a scholarly project which includes quality improvement/patient safety activities, medical education scholarship, and/or basic/translational/clinical research.

Clinical Excellence Pathway

Pathway lead: Majumdar

Background:
Pulmonary and Critical Care (PCCM) training occurs over three years. In years 2 and 3, fellows will have 6 months to focus on scholarly activity. A clinical excellence pathway allows for refinement of clinical skills, developing areas of expertise, and tailoring experience to meet career goals. Fellows will spend additional time at UVMHN network sites (CVMC, CVPH) where they will practice with increasing autonomy and have additional inpatient and/or outpatient electives tailored to needs. Fellows will have dedicated time to allow for a quality improvement/patient safety or research project to be developed and conducted.

Fellows will meet with the Pathway Leader April/May of year 1 to discuss interests and plan rotations for the coming year. Progress will be reviewed in 6-month intervals. Deviations from the requirements may be considered by the Pathway lead in discussion with the Fellowship leadership team.

Flex time:

- 8 weeks of UVHM network electives
- 28 weeks of clinical electives
- 16 weeks for scholarly activity

General requirements to complete Clinical Excellence pathway

I) Knowledge requirements
   a. Completion of NIH course: Introduction to the Principles and Practice of Clinical Research (https://ocreco.od.nih.gov/courses/ippcr.html)

II) Experiential requirements
   a. 8 weeks of additional time at either CVPH or CVMC working in blended ICU +/- pulmonary consultation (depending on site)

b. 28 weeks of outpatient or inpatient clinical electives

III) Scholarship requirements
   a. Participation in a mentored hospital/network quality improvement project (may be combined with other research project)
      i. Presented at UVMMC DOM Quality Showcase and/or at a national conference

Medical Education Pathway

Pathway lead: Garrison

Background:

Pulmonary and Critical Care (PCCM) training occurs over three years. In years 2 and 3, fellows will have 6 months to focus on scholarly activity. A Medical Education pathway would provide opportunity to position fellows well to enter the workforce as educators and find success as leaders in medical education both within and outside of their institutions

Fellows will meet with the Pathway Leader April/May of year 1 to discuss interest and secure approval to enter the pathway. Progress will be reviewed in 6-month intervals with ongoing participation continued based on engagement and productivity. Deviations from the requirements may be considered by the Pathway lead in discussion with the Fellowship leadership team.

Flex time:

- 26 weeks for scholarly activity
- 12 months as a simulation intern
- 14 weeks of clinical electives
  - 4 weeks at a community partner (CVMC/CVPH)
  - 10 weeks of approved UVMMC experiences

General requirements to complete Med Ed Pathway:

I) Foundational knowledge requirements
   a. Completion of LCOM Medical Education Fellowship (https://www.uvm.edu/larnermed/teachingacademy/medical-education-fellowship-program)
      i. Application June of year 1
      ii. LCOM Teaching Academy "Essentials of Teaching and Assessment" in September of fellowship year 2
      iii. Fellowship may extend past 1 year at the discretion of the Teaching Academy Director
   b. Complete requirements for AAMC MERC certificate requirements (https://www.aamc.org/about-us/mission-areas/medical-education/meded-research-certificate-program)
      i. 6 workshops ($125 per workshop)

c. 20 hours of additional Medical Education CME content
d. Completion of NIH course: Introduction to the Principles and Practice of Clinical Research (https://ocreco.od.nih.gov/courses/ippcr.html)
e. Attendance at two or more LCOM Teaching Academy events (stick/mud season events)

II) Experiential requirements
a. Application to LCOM Teaching Academy as a Protégé member in year 2
b. Membership in organization representing medical educators
c. Direct observation of teaching with feedback (minimum 10 hours)
i. UVMMC IM resident half-day
ii. LCOM CRR/FOCUS
iii. UVMMC Pulmonary Grand Rounds
iv. Teaching Academy events
d. 12 or more weeks of internship in LCOM Simulation Center

III) Scholarship requirements
a. Completion of a mentored educational scholarly project
i. Presentation at TA event and/or regional/national conference
ii. Regular participation in scholarship small groups
b. Participation in a hospital/network quality improvement project (may be combined with education project)
i. Presented at UVMMC DOM quality showcase and/or regional/national conference

PCCM Research Pathway

Pathway lead: Duchene

Background:
Pulmonary and Critical Care (PCCM) training occurs over three years. In years 2 and 3, fellows will have 6 months to focus on scholarly activity. A research pathway would provide opportunity to position fellows well to enter the workforce as early career researchers and develop the skills needed to start their own research careers.
Fellows will meet with the Pathway Leader April/May of year 1 to discuss interest and secure approval to enter the pathway. Progress will be reviewed in 6-month intervals with ongoing participation continued based on engagement and productivity. Deviations from the requirements may be considered by the Pathway lead in discussion with the Fellowship leadership team.

Flex time:
- 52 weeks for research time

General requirements to complete Research pathway

I) Knowledge requirements
   a. Completion of NIH course: Introduction to the Principles and Practice of Clinical Research (https://ocreco.od.nih.gov/courses/ippcr.html)
   b. Attendance of the Department of Medicine's Early Career Research Skills Meet Up (2nd Wednesday 12-1)

II) Experiential requirements
   a. Inception of a unique project and execution of a grant application for this project in 3rd year with mock scoring

III) Scholarship requirements
   a. Completion of a mentored project
      i. Presentation at a national conference
      ii. Yearly presentation at VLC
      iii. Presentation in 3rd year at Firestone Fridays regarding project for grant write up
   b. Participation in a hospital/network quality improvement project (may be combined with other research project)
      i. Presented at UVMMC DOM Quality Showcase and/or at a national conference

Educational Conferences and Curricula

Diagnostic bronchoscopy curriculum

Foundational Learning Materials:

- Introduction to bronchoscopy, 2nd edition (Ernst/Herth)
- The Essential Flexible Bronchoscopist, 2nd edition (bronchoscopy.org)
    - https://www.bronchoscopy.org/wp-content/uploads/The-Essential-Flexible-Bronchoscopist-2nd-Edition.pdf
- BronchAtlas (bronchoscopy.org)
    - https://bronchoscopy.org/bronchatlas
- Bronchoscopy Step-by-Step exercises
    - https://www.bronchoscopy.org/wp-content/uploads/Step-by-Step-Description.pdf
- Introductory training videos:
    - Intro to Bronchoscopy: Upper airway anatomy and prep -- BAVLS
    - Intro to Bronchoscopy: Lower airway anatomy -- BAVLS
- Symbionix bronchoscopy simulator (Rowell Sim Lab)

Reading list:

- Weiss SM, Hert RC, Gianola FJ, Clark JG, Crawford SW. Complications of fiberoptic bronchoscopy in thrombocytopenic patients. Chest. 1993 Oct;104(4):1025-8. doi: 10.1378/chest.104.4.1025. PMID: 8404159.
- Herth FJ, Becker HD, Ernst A. Aspirin does not increase bleeding complications after transbronchial biopsy. Chest. 2002 Oct;122(4):1461-4. doi: 10.1378/chest.122.4.1461. PMID: 12377879
- Ninan N, Wahidi MM. Basic Bronchoscopy: Technology, Techniques, and Professional Fees. Chest. 2019 May;155(5):1067-1074. doi: 10.1016/j.chest.2019.02.009. Epub 2019 Feb 16. PMID: 30779915.
- Bahhady IJ, Ernst A. Risks of and recommendations for flexible bronchoscopy in pregnancy: a review. Chest. 2004 Dec;126(6):1974-81. doi: 10.1378/chest.126.6.1974. PMID: 15596701
- Morton C, Puchalski J. The utility of bronchoscopy in immunocompromised patients: a review. J Thorac Dis. 2019 Dec;11(12):5603-5612. doi: 10.21037/jtd.2019.09.72. PMID: 32030281; PMCID: PMC6988056.
- McCambridge AJ, Boesch RP, Mullon JJ. Sedation in Bronchoscopy: A Review. Clin Chest Med. 2018 Mar;39(1):65-77. doi: 10.1016/j.ccm.2017.09.004. Epub 2017 Dec 13. PMID: 29433726.
- Leiten EO, Eagan TML, Martinsen EMH, Nordeide E, Husebø GR, Knudsen KS, Lehmann S, Svanes Ø, Bakke PS, Nielsen R. Complications and discomfort after research bronchoscopy in the MicroCOPD study. BMJ Open Respir Res. 2020 Mar;7(1):e000449. doi: 10.1136/bmjresp-2019-000449. PMID: 32152177; PMCID: PMC7064136.

Year 1

I. Prior to first bronchoscopy
   a. Review "Bronchoscopy Policies and Procedures" below
   b. Review chapters in "Introduction to Bronchoscopy":
      i. Chapter 4 – Airway Anatomy for the Bronchoscopist
      ii. Chapter 3 – The Larynx
      iii. Chapter 5 – Anesthesia for the Bronchoscopy
      iv. Chapter 8 – Indications, Contraindications, and Consent
      v. *Chapter 12 – Bronchoscopy in the ICU (prior to first ICU bronch)
   c. Review Bronchoscopy Step-by-Step
   d. Watch UW/ATS training videos:
      i. Intro to Bronchoscopy: Upper airway anatomy and prep -- BAVLS
      ii. Intro to Bronchoscopy: Lower airway anatomy -- BAVLS
   e. Review quick guide on informed consent
   f. Complete introductory cases on Symbionix bronchoscopy simulator (UVM Bronchoscopy Orientation). Completing additional modules may help improve your comfort level when you start.
   g. BronchAtlas, part 1a, 1b (bronchoscopy report)
   h. Moderate sedation primer

II. Prior to specific procedures:
   a. Bronchoalveolar lavage:
      i. "Introduction to Bronchoscopy", chapter 9, pgs 103-112
      ii. Watch video – Bronchoalveolar lavage in the ICU
      iii. BronchAtlas – Bronchoalveolar lavage
   b. Endobronchial biopsy
      i. "Introduction to Bronchoscopy", chapter 9, pgs 113-114
      ii. BronchAtlas – Endobronchial biopsy
   c. Bronchial brushing
      i. "Introduction to Bronchoscopy", chapter 9, pg 112
      ii. BronchAtlas – Bronchial brushing
   d. Transbronchial needle aspiration
      i. "Introduction to Bronchoscopy", chapter 11
   e. Transbronchial biopsy
      i. "Introduction to Bronchoscopy", chapter 10
      ii. BronchAtlas
         1. TBLB Indications and Techniques
         2. TBLB Fluoroscopy and Wedge Techniques
         3. TBLB related complications
      iii. Watch video – Transbronchial biopsies – BAVLS

III. By the END of first consult rotation:
   a. "Introduction to Bronchoscopy"
      i. Chapter 1 – A short history of bronchoscopy
      ii. Chapter 2 – Multidetector computed tomography of the central airways
      iii. Chapter 6 – Anatomy and care of the bronchoscope
   b. BronchAtlas –
      i. Part 2A – Normal Anatomy of Upper Airway and Larynx
      ii. Part 2B – Normal Anatomy of the Trachea
      iii. Part 2C – Normal Anatomy of the Bronchial Tree
      iv. Part 2D – Variant Airway Anatomy

IV. By the END of first year of training:
   a. "Introduction to Bronchoscopy"
      i. Review chapters on any procedures not performed
   b. BronchAtlas – airway abnormalities
      i. Part 4A – The Upper Airway
      ii. Part 5A – The Trachea
      iii. Part 6A – The Bronchi
      iv. Part 7A – Malignant Airway Disorders
      v. Part 8A – Benign Airway Disorders
      vi. Part 9A – Wegener's Granulomatosis
   c. Complete Symbionix bronchoscopy simulator cases on hemoptysis
   d. Complete and log 50-60 bronchoscopy cases
      i. Each unique patient counts as one procedure
      ii. Each transbronchial biopsy can be logged
   e. Obtain formal feedback on a minimum of 10 cases using OBAT assessment
   f. Complete and pass BSTAT assessment bronchoscopy assessment during final consult block

Year 2

I. EBUS - training: see EBUS training curriculum

II. By the END of second year of training:
   a. "Introduction to Bronchoscopy"
      i. Chapter 13 – Basic endobronchial ultrasound
      ii. Chapter 15 – Basic navigation techniques
      iii. Chapter 16 – Basic therapeutic techniques
      iv. Chapter 7 – Starting and managing a bronchoscopy unit
   b. BronchAtlas
      i. Part 10A – Histopathology of squamous cell lung cancer
      ii. Part 10B – Histopathology of adeno and large cell carcinoma
      iii. Part 10C – Histopathology of small cell lung cancer
   c. Obtain formal feedback on a minimum of 10 cases using OBAT

d. Bronchoscopy log should have at least 75 cases

Year 3

I. By the END of year 3
   a. Essential flexible bronchoscopist, modules I-IV
   b. Review remaining articles on the reading list

Bronchoscopy Policies and Procedure

Introduction

The division of Pulmonary and Critical Care Medicine performs flexible bronchoscopies for the diagnosis of various lung diseases and for therapeutic purposes in select cases. Bronchoscopy is available on a consultation basis to all patients admitted to the University of Vermont Medical Center.

The bronchoscopy suite is located in the Medical Procedures Unit (MPU). Most bronchoscopies are done in this space, which is an aerosol infectious isolation space able to accommodate fluoroscopy. Bronchoscopies may also be performed in intensive care units or in the operating room as needed.

I. Staff Participation

A. A minimum of one surgical nurse and one respiratory therapist will participate in the case. If the case is performed under general anesthesia, an anesthesia provider will be assigned and responsible for sedative administration.

B. Prior to the procedure, the respiratory therapist is responsible for checking and assessing that equipment is available and functional (including bronchoscope, light source, suction apparatus, and fluoroscope.)

C. Prior to the procedure the nurse and the respiratory therapist will administer topical lidocaine, set up and administer supplemental oxygen, and participate in the pre-procedure "Time-Out"

D. The primary assistant for all procedures will be the respiratory therapist. The respiratory therapist will assist with such activities as giving topical lidocaine pushes, will introduce and manipulate instruments under physician direction and will assist with other bronchoscopy related needs

including correct collection and labeling of specimens, and handling of waste in accordance with safety and infection control policies.

E. The nurse and respiratory therapist are also responsible for maintaining adequate supplies and keeping accurate records.

F. Bronchoscope cleaning is handled by Central Sterile Reprocessing (CSR)

II. Fellow Participation

A. Bronchoscopies will be done by a pulmonary fellow under the direct supervision of an attending physician who is credentialed for bronchoscopy. In general, a fellow will do all the initial inspection and evaluation of the bronchial tree in patients undergoing EBUS and selected navigation bronchoscopies. Navigation of an EBUS scope is primarily a second and third year skill although at the attending physician's discretion, the first year fellow may do the more advanced procedures appropriate to the ability of each fellow.

B. When a fellow is participating in the case, the fellow will be responsible for reviewing the case prior to the procedure and ensuring that there is informed consent documented in the medical record.

III. Indications and Contradictions

A. Diagnostic uses:

a. To evaluate lung lesions of unknown etiology
b. To stage lung cancer pre-operatively
c. To investigate unexplained hemoptysis, unexplained cough (or change in the nature of a cough), localized wheeze, or stridor.
d. To assess airway patency
e. To search for the origin of suspicious or positive sputum cytology
f. To determine the etiology of unexplained recurrent laryngeal nerve paralysis or the recent onset of paralysis of the diaphragm.
g. To evaluate problems associated with endotracheal tubes, such as tracheal damage, airway obstruction, or intubation of the right main bronchus.
h. To check for pharyngeal or laryngeal lesions
i. To obtain selective cultures in pneumonia or lung abscess using a special double sheathed sterile brush.
j. To evaluate thoracic trauma when a bronchial tear is suspected
k. To evaluate a suspected tracheosophageal fistula.
l. To determine the location and extent of respiratory tract injury in cases of fire, acute inhalation (noxious fumes) and gastric aspiration.

B. Therapeutic uses:

a. To remove retained secretions or plugs not removed by conventional techniques
b. To remove foreign bodies

c. To relieve airway obstruction due to benign or malignant lesions using cryotherapy, electrocautery, brachytherapy, laser, argon plasma coagulation, or other ablative techniques or stenting or any combination of these.
d. To perform difficult intubations, eg. On patients with cervical spondylitis, dental problems, myasthenia gravis, acromegaly achalasia, full stomach, small bowel obstruction, and trauma to the head and neck, larynx, or trachea.

C. Relative contraindications to flexible bronchoscopies:
a. Lack of patient consent.
b. Lack of patient cooperation
1. Recent myocardial infarction
2. Malignant arrhythmias
c. Uncorrectable hypoxemia
d. Unstable bronchial asthma (except in intubated patients in whom bronchoscopy is indicated for removal of mucus plugs)
e. Massive hemoptysis (rigid bronchoscopy preferable)
f. Lung abscess with air fluid level especially if infection is not under control – danger of flooding the airways with purulent material
g. Partial tracheal obstruction or bilateral vocal cord paralysis – danger of inducing complete airway obstruction

D. Relative contraindications to biopsies (including TBBx)
a. Clinical evidence of bleeding disorder
b. Coagulopathy (INR >1.5)
c. Platelet dysfunction due to antiplatelet agents including clopidogrel and ticagrelor (aspirin is OK)
d. Thrombocytopenia (platelet count <100,000/uL)
e. Pulmonary hypertension (+/- commonly discussed, limited data on risk of bleeding; may present risk of hypotention with sedation/anesthesia)
f. Uremia – danger of serious hemorrhage even in the presence of normal coagulation parameters. Biopsies may be done with caution, preferably soon after dialysis, (if indicated) and/or administration of a DDAVP.
g. Patient on mechanical ventilation (+/-,commonly discussed, limited data on risk of tension pneumothorax)

E. Bronchoscopes available, minimum size for airway

Scope	Model	Distal diameter	Mid diameter	Working channel	Min.ETT size	Min.Trach size
Adult diagnostic (“small adult”)	BF-H190	5.5mm	5.1mm	2mm	7.5	6.0

Adult therapeutic ("large adult")	BF-1TH190	6.2mm	6.0mm	2.8mm	8.0	6.5
Pediatric	BF-3C160	3.8mm	3.8mm	1.2mm	5.0	4.5
EBUS	BF-UC180F	6.9mm	6.2mm	2.2mm	8.5	7.5

IV. Standard Operating Procedures

A. Scheduling of non-ICU bronchoscopies

a. All procedures must be ordered through Epic
   1. Must include indication, date, patient status

b. For urgent scheduling, notify the schedulers in Pulmonary Clinic

B. Pre-bronchoscopy preparation

a. All patients undergoing flexible bronchoscopy must have:
   1. H&P (both inpatients and outpatients) within 30 days
   2. Informed consent process and documentation

b. Pre-bronchoscopy laboratory evaluation:
   1. Routine laboratory evaluation may not be needed for conventional bronchoscopy without biopsy. Exceptions may include:
      a. Known or suspected anemia or thrombocytopenia: CBC
      b. Recent use of warfarin: INR
      c. Known electrolyte or renal disorder: BMP
      d. Bleeding disorder suspected: CBC, INR
      e. Plan for transbronchial biopsy: CBC, INR, BMP

c. Pre-bronchoscopy clinical assessment:
   1. Confirm bronchoscopic procedures needed
   2. Assess current clinical stability to undergo procedure
   3. Confirm active medical history
   4. Confirm active medications and ensure no recent anticoagulants or antiplatelet agents (aspirin is allowed)
   5. Document pre-procedure assessment in Epic prior to start of procedure for patients undergoing conscious sedation
      a. Cardiopulmonary exam
      b. ASA grade
         i. ASA 1 – normal healthy patient
         ii. ASA 2 – mild systemic disease (e.g. controlled hypertension; no functional limitation)
         iii. ASA 3 – severe systemic disease that is not a constant threat to life (e.g. symptomatic COPD)
         iv. ASA 4 – severe systemic disease that is a constant threat to life (e.g. septic shock)

v. ASA 5 – moribund patient not expected to survive

c. Mallampati score

i. Mallampati 1. The patient's tonsils, uvula, and soft palate are completely visible.

ii. Mallampati 2. Hard and soft palate, upper tonsils, and uvula are visible.

iii. Mallampati 3 Hard and soft palate are visible, uvula is somewhat obscured.

iv. Mallampati 4. Only hard palate is visible

C. Anesthesia and sedation considerations

a. Oral intake rules:

1. No fatty food or meat for 8 hours
2. No milk or light food for 6 hours
3. No clears for 2 hours

b. All patients should have an intravenous KVO line in place prior to procedure. It is the responsibility of the preprocedure nurses to place these lines if the patients are outpatients. Inpatients should have lines in place prior to coming to the bronchoscopy suite.

c. Lidocaine 1% is used for topical airway anesthesia and is delivered by respiratory therapists via atomization prior to the procedure and by the proceduralists via the bronchoscope during the procedure. The total dose of lidocaine should be documented.

d. Co-phenylcaine is used to anesthetize the nasal passage. Respiratory therapy will administer prior to the procedure.

e. Midazolam (Versed) and fentanyl are the preferred agents for moderate sedation for bronchoscopy. An operating room nurse must be available for monitoring, continuous oximetry, electrocardiographic monitoring, and blood pressure monitoring. Proper documentation of all sedatives will be maintained. Nurses should verbally confirm with the doctor doses of medication given and the total doses of all sedative received when additional pushes of medications are given.

D. Approach

a. Flexible bronchoscopy is preferably performed by the trans-nasal approach after appropriate topical anesthesia. The patient's mouth should be covered with a surgical mask. If for some reason the trans-nasal approach cannot be used, bronchoscopy should be performed by the oral route or through an endotracheal tube. A bite guard must always be used when the oral route is employed

b. All transbronchial lung biopsies are done under fluoroscopic guidance. Fluoroscopy may be performed prior to the procedure to rule out new, unsuspected lesions, and may be performed following the completion of the procedure, to evaluate for a pneumothorax.

E. Monitoring for complications associated with bronchoscopy

a. Lidocaine toxicity – the reported incidence is very low when a maximum dose of 8mg/kg is given. 1% solution of lidocaine = 10mg/mL
b. Post-bronchoscopy fever – occurs in 16% of all cases, usually lasts 12-24 hours and does not require treatment beyond anti-pyretics.
c. Hypoxemia – in the majority of patients p02 decreases 10-20mmHg during bronchoscopy, but quickly returns to baseline afterwards
d. Pneumothorax – reported to occur in 1-5% of patients following transbronchial lung biopsy
e. Pulmonary hemorrhage – blood loss greater than 50cc following transbronchial and endobronchial biopsy is reported to occur in 5-9% of patients following transbronchial lung biopsy
f. Bacteremia is a rare complication
g. Pneumonia is a rare complication
h. Cardiac arrhythmias – the reported incidence of VPC's is 0.5%
i. Bronchospasm and laryngospasm – very low incidence.
j. Death – incidence overall is 0.1-.01%, and is usually due to hemorrhage or arrhythmias.

V. Post Bronchoscopy

A. Patients receive appropriate monitoring in accordance with the policy and procedures for moderate sedation and analgesia.

B. Chest X-Rays are performed on patients who receive transbronchial biopsies within 6 hours of the procedure to rule out pneumothorax.

VI. Procedures for Managing Complications

A. In any unstable patient, if there is any indication of hemodynamic or respiratory insufficiency, a rapid response should be called. If airway compromise is present, call cardiac arrest (anesthesia is a member of code but not rapid response teams)

B. Three potentially life-threatening complications that can occur during flexible bronchoscopy are

a. Hemorrhage
    1. Keep the bronchoscope wedged into the bronchus of the lobe where the biopsy was taken. Instill iced saline or epinephrine 1:10,000 and keep the bronchoscope wedged until the bleeding has stopped. Balloon occlusion catheters are always available and may be inserted with the bronchoscope to occlude the bleeding bronchus. If the hemorrhage is not controlled by these maneuvers, endotracheal intubation may be necessary. The patient should be positioned in the lateral decubitus position, with the bleeding side down. Rapid response or cardiac arrest (code) should be called if patient is unstable.
b. Pneumothorax

1. Depending on the extent of the pneumothorax, manual aspiration of air via a catheter may be attempted; if this fails, a small-bore chest tube may be placed

c. Broncho-or laryngospasm
    1. Remove bronchoscope. Epinephrine can be administered via the bronchoscope before removal. Administer epinephrine subcutaneously or intravenously and other bronchodilators via inhalation. IV steroids may also be given. If laryngospasm persists, positive airway pressure using and ambu bag may work, but it may be necessary to intubate the patient.

VII. Fluoroscopy Precautions: - during procedures that require the use of fluoroscopy the door to the bronchoscopy room must be closed. All persons present in the room other than the patient must wear appropriate shielding i.e. lead aprons, thyroid shields. Bronchoscopy personnel must use appropriate radiation monitoring devices which are received from and retuned to Radiation Safety on a periodic basis. Actual time of fluoroscopy use should be kept to the minimum needed to complete the procedure safely. Fluoro time must be recorded.

VIII. Record Keeping – All bronchoscopies performed in the MPU, must be documented in Endovault. A brief procedure note should be documented following the procedure. When Endovault note is co-signed by the attending it is automatically populated into the EMR system. Records of patient monitoring during the procedure are documented in accordance with the hospital policy for sedation and analgesia.

PCCM Endobronchial Ultrasound Curriculum

Foundational Learning Materials:

- The Essential EBUS bronchoscopist
- EBUS basics and mediastinal staging – BAVLS
- CT-WLB-EBUS Correlations (bronchoscopy.org)
- El-Sherief AH, Lau CT, Wu CC, Drake RL, Abbott GF, Rice TW. International association for the study of lung cancer (IASLC) lymph node map: radiologic review with CT illustration. Radiographics. 2014 Oct;34(6):1680-91. doi: 10.1148/rg.346130097
- Kinsey CM, Arenberg DA. Endobronchial ultrasound-guided transbronchial needle aspiration for non-small cell lung cancer staging. Am J Respir Crit Care Med. 2014 Mar 15;189(6):640-9. doi: 10.1164/rccm.201311-2007CI
- Detterbeck FC, Boffa DJ, Kim AW, Tanoue LT. The Eighth Edition Lung Cancer Stage Classification. Chest. 2017 Jan;151(1):193-203. doi: 10.1016/j.chest.2016.10.010. Epub 2016 Oct 22
- Symbionix bronchoscopy simulator (Rowell Sim Lab)

Reading list (GL = guideline, LM = landmark trial):

- (GL) Wahidi MM, Herth F, Yasufuku K, Shepherd RW, Yarmus L, Chawla M, Lamb C, Casey KR, Patel S, Silvestri GA, Feller-Kopman DJ. Technical Aspects of Endobronchial Ultrasound-Guided Transbronchial Needle Aspiration: CHEST Guideline and Expert Panel Report. Chest. 2016 Mar;149(3):816-35. doi: 10.1378/chest.15-1216
- (LM) Yasufuku K, Pierre A, Darling G, de Perrot M, Waddell T, Johnston M, da Cunha Santos G, Geddie W, Boerner S, Le LW, Keshavjee S. A prospective controlled trial of endobronchial ultrasound-guided transbronchial needle aspiration compared with mediastinoscopy for mediastinal lymph node staging of lung cancer. J Thorac Cardiovasc Surg. 2011 Dec;142(6):1393-400.e1. doi: 10.1016/j.jtcvs.2011.08.037
- (LM) Lee HS, Lee GK, Lee HS, Kim MS, Lee JM, Kim HY, Nam BH, Zo JI, Hwangbo B. Real-time endobronchial ultrasound-guided transbronchial needle aspiration in mediastinal staging of non-small cell lung cancer: how many aspirations per target lymph node station? Chest. 2008 Aug;134(2):368-374. doi: 10.1378/chest.07-2105
- Uzbeck MH, Eapen GA, Jimenez CA, Nogueras-Gonzalez GM, Sarkiss M, Morice RC. Randomized clinical trial of endobronchial ultrasound needle biopsy with and without aspiration. Chest. 2012 Sep;142(3):568-573. doi: 10.1378/chest.11-0692.
- Oki M, Saka H, Kitagawa C, Kogure Y, Murata N, Adachi T, Ando M. Rapid on-site cytologic evaluation during endobronchial ultrasound-guided transbronchial needle aspiration for diagnosing lung cancer: a randomized study. Respiration. 2013;85(6):486-92. doi: 10.1159/000346987
- Gupta D, Dadhwal DS, Agarwal R, Gupta N, Bal A, Aggarwal AN. Endobronchial ultrasound-guided transbronchial needle aspiration vs conventional transbronchial needle aspiration in the diagnosis of sarcoidosis. Chest. 2014 Sep;146(3):547-556. doi: 10.1378/chest.13-2339
- Grosu HB, Iliesiu M, Caraway NP, Medeiros LJ, Lei X, Jimenez CA, Morice RC, Casal RF, Ost D, Eapen GA. Endobronchial Ultrasound-Guided Transbronchial Needle Aspiration for the Diagnosis and Subtyping of Lymphoma. Ann Am Thorac Soc. 2015 Sep;12(9):1336-44

- Meena N, Abouzgheib W, Patolia S, Rosenheck J, Boujaoude Z, Bartter T. EBUS-TBNA and EUS-FNA: Risk Assessment for Patients Receiving Clopidogrel. J Bronchology Interv Pulmonol. 2016 Oct;23(4):303-307

Year 1

I. Prior to first EBUS during subspecialty training block:
   a. Complete introductory cases on Symbionix simulator (UVM EBUS Curriculum)
   b. Watch video - EBUS basics and mediastinal staging – BAVLS
   c. Attend EBUS learning sessions

Year 2

I. Prior to first procedure during initial EBUS fellow month:
   a. Repeat introductory cases on Symbionix simulator (UVM EBUS Curriculum)
   b. Re-watch video - EBUS basics and mediastinal staging – BAVLS
   c. Review CT-WLB-EBUS Correlations (bronchoscopy.org)
   d. Read radiologic review of IASLC lymph node map: El-Sherief AH, Lau CT, Wu CC, Drake RL, Abbott GF, Rice TW. International association for the study of lung cancer (IASLC) lymph node map: radiologic review with CT illustration. Radiographics. 2014 Oct;34(6):1680-91. doi: 10.1148/rg.346130097

II. Prior to end of first EBUS month:
   a. Read review of lung cancer staging protocol: Kinsey CM, Arenberg DA. Endobronchial ultrasound-guided transbronchial needle aspiration for non-small cell lung cancer staging. Am J Respir Crit Care Med. 2014 Mar 15;189(6):640-9. doi: 10.1164/rccm.201311-2007CI
   b. Read overview of JACC 8th edition TNM staging of lung cancer: Detterbeck FC, Boffa DJ, Kim AW, Tanoue LT. The Eighth Edition Lung Cancer Stage Classification. Chest. 2017 Jan;151(1):193-203. doi: 10.1016/j.chest.2016.10.010. Epub 2016 Oct 22

III. Prior to end of 2nd year
   a. Review guideline and landmark trials
   b. Attend EBUS learning sessions
   c. Case log should include a minimum of 25 cases

Year 3

I. Prior to end of the first EBUS block during 3rd year:
   a. Complete year 2 items if not done
   b. Read the remainder of the items on the reading list

II. Prior to the end of year 3
   a. Satisfactory completion of EBUS-STAT assessment (95/100)
   b. Case log should include a minimum of 50 cases

EBUS Bronchoscopy Policies and Procedures

Introduction

The division of Pulmonary and Critical Care Medicine performs endobronchial ultrasound bronchoscopies for the diagnosis of thoracic malignancy and for staging of malignancy prior to therapy. Bronchoscopy is available on a consultation basis to all patients admitted to the University of Vermont Medical Center.

The bronchoscopy suite is located in the Medical Procedures Unit (MPU) at the University of Vermont Medical Center. Most bronchoscopies are done in this space, which is an aerosol infectious isolation space able to accommodate fluoroscopy.

IX. Staff Participation

- **A.** EBUS cases are performed under general anesthesia delivered by an anesthesia provider. Exceptions can be considered in limited cases.
- **B.** A minimum of one surgical nurse and one respiratory therapist will participate in the case.
- **C.** Prior to the procedure, the respiratory therapist is responsible for checking and assessing that equipment is available and functional (including bronchoscope, light source, suction apparatus).
- **D.** Prior to the procedure all members of the procedure suite will participate in the pre-procedure "Time-Out"
- **E.** The primary assistant for all procedures will be the respiratory therapist. The respiratory therapist will assist with such activities as giving topical lidocaine pushes, will introduce and manipulate instruments under physician direction and will assist with other bronchoscopy related needs including correct collection and labeling of specimens, and handling of waste in accordance with safety and infection control policies.
- **F.** The nurse and respiratory therapist are also responsible for maintaining adequate supplies and keeping accurate records.
- **G.** Bronchoscope cleaning is handled by Central Sterile Reprocessing (CSR)

X. Fellow Participation

- **A.** Bronchoscopies will be done by a pulmonary fellow under the direct supervision of an attending physician who is credentialed for EBUS bronchoscopy. In general, a fellow will do all the initial inspection and evaluation of the bronchial tree in patients undergoing EBUS. Navigation of an EBUS scope is primarily a second- and third-year skill although at the attending physician's discretion, the first year fellow may do the more advanced procedures appropriate to the ability of each fellow.

B. When a fellow is participating in the case, the fellow will be responsible for reviewing the case prior to the procedure and ensuring that there is informed consent documented in the medical record.

XI. Indications and Contradictions

F. Diagnostic uses:
- a. Invasive evaluation of thoracic lymphadenopathy
- b. Mediastinal lymph node staging in patients with diagnosis if lung cancer
- c. Biopsy of endobronhial, paratracheal or hilar masses

G. Therapeutic uses:
- a. To remove retained secretions or plugs not removed by conventional techniques
- b. To remove foreign bodies
- c. To relieve airway obstruction due to benign or malignant lesions using cryotherapy, electrocautery, brachytherapy, laser, argon plasma coagulation, or other ablative techniques or stenting or any combination of these.
- d. To perform difficult intubations, eg. On patients with cervical spondylitis, dental problems, myasthenia gravis, acromegaly achalasia, full stomach, small bowel obstruction, and trauma to the head and neck, larynx, or trachea.

H. Relative contraindications to flexible bronchoscopies:
- a. Lack of patient consent.
- b. Lack of patient cooperation
  1. Recent myocardial infarction
  2. Malignant arrhythmias
- c. Uncorrectable hypoxemia
- d. Unstable bronchial asthma (except in intubated patients in whom bronchoscopy is indicated for removal of mucus plugs)
- e. Massive hemoptysis (rigid bronchoscopy preferable)
- f. Lung abscess with air fluid level especially if infection is not under control – danger of flooding the airways with purulent material
- g. Partial tracheal obstruction or bilateral vocal cord paralysis – danger of inducing complete airway obstruction

I. Relative contraindications to biopsies (including TBBx)
- a. Clinical evidence of bleeding disorder
- b. Coagulopathy (INR >1.5)
- c. Platelet dysfunction due to antiplatelet agents including clopidogrel and ticagrelor (aspirin is OK)
- d. Thrombocytopenia (platelet count <100,000/uL)
- e. Pulmonary hypertension (+/- commonly discussed, limited data on risk of bleeding; may present risk of hypotention with sedation/anesthesia)
- f. Uremia – danger of serious hemorrhage even in the presence of normal coagulation parameters. Biopsies may be done with caution, preferably soon after dialysis, (if indicated) and/or administration of a DDAVP.
- g. Patient on mechanical ventilation (+/-,commonly discussed, limited data on risk of tension pneumothorax)

J. Bronchoscopes available, minimum size for airway

Scope	Model	Distal diameter	Mid diameter	Working channel	ETT size	Trach size
Adult diagnostic	BF-H190	5.5mm	5.1mm	2mm	7.5	6.0
Adult therapeutic	BF-1TH190	6.2mm	6.0mm	2.8mm	8.0	6.5
Pediatric	BF-3C160	3.8mm	3.8mm	1.2mm	5.0	4.5
EBUS	BF-UC180F	6.9mm	6.2mm	2.2mm	8.5	7.5

XII. Standard Operating Procedures

A. Scheduling of non-ICU bronchoscopies
- a. All procedures must be ordered through Epic
  1. Must include indication, date, patient status
- b. For urgent scheduling, notify the schedulers in Pulmonary Clinic

B. Pre-bronchoscopy preparation
- a. All patients undergoing bronchoscopy must have:
  1. Clinical evaluation/H&P (both inpatients and outpatients) within 30 days including cardiac and pulmonary exam
  2. Informed consent process and documentation, preferably in Epic
- b. Pre-bronchoscopy laboratory evaluation:
  1. Routine laboratory evaluation may not be needed for conventional bronchoscopy without biopsy. Exceptions may include:
     a. Known or suspected anemia or thrombocytopenia: CBC
     b. Recent use of warfarin: INR
     c. Known electrolyte or renal disorder: BMP
     d. Bleeding disorder suspected: CBC, INR
     e. Plan for transbronchial biopsy: CBC, INR, BMP
- c. Pre-bronchoscopy clinical assessment:
  1. Confirm bronchoscopic procedures needed
  2. Assess current clinical stability to undergo procedure
  3. Confirm active medical history
  4. Confirm active medications and ensure no recent anticoagulants or antiplatelet agents (aspirin is allowed)

C. Anesthesia and sedation considerations
- a. Oral intake rules:
  1. No fatty food or meat for 8 hours
  2. No milk or light food for 6 hours
  3. No clears for 2 hours
- b. All patients should have an intravenous KVO line in place prior to procedure. It is the responsibility of the Preprocedure area nurses to place these lines if the patients are outpatients. Inpatients should have lines in place prior to coming to the bronchoscopy suite.
- c. Lidocaine 1% is used for topical airway anesthesia and is delivered by respiratory therapists via atomization prior to the procedure and by the proceduralists via the bronchoscope during the procedure. The total dose of lidocaine should be documented.

D. Approach
   a. EBUS bronchoscopy is performed in patients who are receiving deep sedation or general anesthesia and have an airway in place. The bronchoscope is introduced via the airway (LMA or ETT).
   b. When deemed safe, a laryngeal mask airway (LMA) is preferred over an endotracheal tube. LMA typically allows improved mobility of the bronchoscope and better ultrasound contact with the tracheal wall.
   c. All transbronchial needle aspirations performed during EBUS should be performed with real-time ultrasound imaging.

E. Monitoring for complications associated with EBUS bronchoscopy
   a. Lidocaine toxicity – the reported incidence is very low when a maximum dose of 8mg/kg is given. 1% solution of lidocaine = 10mg/mL
   b. Post-bronchoscopy fever – occurs in 16% of all cases, usually lasts 12-24 hours and does not require treatment beyond anti-pyretics.
   c. Hypoxemia – in the majority of patients p02 decreases 10-20mmHg during bronchoscopy, but quickly returns to baseline afterwards
   d. Pneumothorax is rare in EBUS with TBNA
   e. Pulmonary hemorrhage is rare in EBUS with TBNA
   f. Bacteremia is a rare complication
   g. Pneumonia is a rare complication
   h. Cardiac arrhythmias – the reported incidence of VPC's is 0.5%
   i. Bronchospasm and laryngospasm – very low incidence.
   j. Death – incidence overall is 0.1-.01%, and is usually due to hemorrhage or arrhythmias.

XIII. Post Bronchoscopy

A. Patients receive appropriate monitoring in accordance with the policy and procedures for moderate sedation and analgesia.

B. Chest X-Rays are generally not required following EBUS and transbronchial needle aspiration of paratracheal and hilar lymph nodes. It should be considered if sampling more distal nodes. CXR should be obtained for any new cardiopulmonary symptoms post-procedure.

XIV. Procedures for Managing Complications

A. In any unstable patient, if there is any indication of hemodynamic or respiratory insufficiency, a rapid response should be called. If airway compromise is present, call cardiac arrest (anesthesia is a member of code but not rapid response teams)

B. Three potentially life-threatening complications that can occur during flexible bronchoscopy are
   a. Hemorrhage
      1. Keep the bronchoscope wedged into the bronchus of the lobe where the biopsy was taken. Instill iced saline or epinephrine 1:10,000 and keep the bronchoscope wedged until the bleeding has stopped. Balloon occlusion catheters are always available and may be inserted with the bronchoscope to occlude the bleeding bronchus. If the hemorrhage is not controlled by these maneuvers, endotracheal intubation may be necessary. The patient should be positioned in the lateral decubitus position, with the bleeding side down. Rapid response or cardiac arrest (code) should be called if patient is unstable.

b. Pneumothorax
    1. Depending on the extent of the pneumothorax, manual aspiration of air via a catheter may be attempted; if this fails, a small-bore chest tube may be placed
c. Broncho-or laryngospasm
    1. Remove bronchoscope. Epinephrine can be administered via the bronchoscope before removal. Administer epinephrine subcutaneously or intravenously and other bronchodilators via inhalation. IV steroids may also be given. If laryngospasm persists, positive airway pressure using and Ambu bag may work, but it may be necessary to intubate the patient.

XV. Record Keeping

A. All bronchoscopies performed in the MPU, must be documented in Endovault. A brief procedure note should be documented following the procedure. When Endovault note is co-signed by the attending it is automatically populated into the EMR system.

B. Records of patient monitoring during the procedure are documented in accordance with the hospital policy for sedation and analgesia.

EBUS training program learning objectives

Lung cancer clinical features and pathobiology

- Understand risk factors for lung cancer
- Recognize common histologic appearances of small call carcinoma, adenocarcinoma, squamous cell carcinoma
- Recognize common clinical presentations for different lung cancer histologies
- Recognize radiographic features of lung cancer and pathologic adenopathy on x-ray, CT, and PET-CT imaging
- Understand the TNM staging for lung cancer
- Understand initial treatment choices for lung cancer based on stage
- Understand the role of genetic testing in lung cancer treatment and recognize common genetic drivers for the disease
- Apply knowledge of lung cancer staging to patient with suspected intrathoracic malignancy and develop a plan for diagnosis and staging

Anatomy knowledge

- Identify normal mediastinal and hilar structures on radiographic studies
- Identify locations of IASLC defined lymph node stations on radiographic studies
- Recognize pathologic lymph node enlargement on radiographic studies

Endobronchial ultrasound pre-procedural knowledge

- Recognize pathologic mediastinal abnormalities seen on imaging studies that warrant evaluation

- Identify patients for whom endobronchial ultrasound evaluation and biopsy is appropriate for diagnosis or staging.
- Understand risks of EBUS and biopsy procedures
- Understand benefit/yield of EBUS guided TBNA
- Understand indications for cores biopsy and FNA
- Identify patient factors that increase risk for procedural complications
- Apply knowledge of indications and risk to obtain consent for the procedure
- Develop a procedural plan following a patient evaluation that includes plan for biopsy location and types of samples to be collected
- Communicate effectively with ancillary services including anesthesiology and cytopathology regarding the procedural indications and plan

Endobronchial ultrasound procedural competency

- Understand the components of the bronchoscope
- Understand appropriate set-up of the bronchoscopy and bronchoscopy tower for EBUS
- Demonstrate efficient movement of the bronchoscope in the airway
- Identify vascular structures within the mediastinum
- Identify IASCLC defined lymph node stations
- Recognize lymphadenopathy and abnormal echodensities during procedure
- Identify abnormality on chest CT and identify corresponding location with ultrasound
- Perform successful EBUS guided TBNA
- Identify appropriate sampling on microscopy of air dried slides
- Perform successful EBUS guided core needle biopsy
- Identify procedural complications
- Communicate effectively with patients and caregivers regarding procedure outcome

Point of Care Ultrasound Curriculum

Recommended learning materials:

- Introductory training videos
    - Ultrasound basics – BAVLS
    - Introduction to lung ultrasound – BAVLS
    - Ultrasound artifacts – BAVLS
- ATS Seminar on Intensive Care Ultrasound
    - Introduction
    - Physics, Equipment, and Image Quality
    - Central Venous Access and Venous Diagnostic Ultrasound
    - Lung and Pleural Ultrasound for the Intensivist
    - Abdominal Ultrasound in Critical Care
    - Goal Directed Echocardiography
    - Fluid Responsiveness and Shock Assessment
- Core Ultrasound Podcast and Videos:
    - Right Heart Disfunction, Diastolic Function (3 part series),
- New Technology in Ultrasound Education Podcast

Reading list:

- Wernecke K, Galanski M, Peters PE, Hansen J. Pneumothorax: evaluation by ultrasound--preliminary results. J Thorac Imaging. 1987 Apr;2(2):76-8. PMID: 3298684.
- Lichtenstein DA, Mezière GA. Relevance of lung ultrasound in the diagnosis of acute respiratory failure: the BLUE protocol. Chest. 2008 Jul;134(1):117-25. doi: 10.1378/chest.07-2800. Epub 2008 Apr 10. Erratum in: Chest. 2013 Aug;144(2):721. PMID: 18403664; PMCID: PMC3734893.
- Mojoli F, Bouhemad B, Mongodi S, Lichtenstein D. Lung Ultrasound for Critically Ill Patients. Am J Respir Crit Care Med. 2019 Mar 15;199(6):701-714. doi: 10.1164/rccm.201802-0236CI. Erratum in: Am J Respir Crit Care Med. 2020 Apr 15;201(8):1015. Erratum in: Am J Respir Crit Care Med. 2020 Jun 1;201(11):1454. PMID: 30372119.
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Year 1

I. Prior and during first week in the Medical Intensive Care Unit
    a. Review curriculum goals
    b. Review introductory training videos
        i. Ultrasound basics – BAVLS
        ii. Introduction to lung ultrasound – BAVLS
        iii. Ultrasound artifacts – BAVLS

c. Attend US-guided central venous catheter simulation training with Dr. Simons
d. Attend sim center procedure orientation session with Dr. Morrissette
e. Hands-on ultrasound orientation with Dr. Morrissette

II. During your first MICU rotation
a. Review all ATS seminar items
b. Submit the following for quality review:
    i. 10 cardiac exams
    ii. 5 pleural/pulmonary exams
    iii. 5 abdominal exams
    iv. 5 vascular exams

III. By the end of year 1
a. Attend didactic learning sessions
b. Attend US quality review sessions
c. Total procedure volume submitted for quality review should be:
    i. 25 cardiac exams
    ii. 15 pleural/pulmonary exams
    iii. 15 abdominal exams
    iv. 15 vascular exams

Year 2

I. By the end of year 2
a. Review items on reading list
b. Attend didactic learning sessions
c. Attend US quality review sessions
d. Total procedure volume submitted for review should be:
    i. 40 cardiac exams
    ii. 25 pleural/pulmonary exams
    iii. 25 abdominal exams
    iv. 25 vascular exams

Year 3

I. By the end of year 3
a. Attend didactic learning sessions
b. Attend US quality review sessions
c. Total procedure volume submitted for review should be:
    i. >50 cardiac exams
    ii. >30 pleural/pulmonary exams
    iii. >30 abdominal exams
    iv. >30 vascular exams

Policies and procedures

A. Didactic curriculum overview: During the academic year, there will be a series of didactic sessions on POCUS topics and group image quality review. Didactic topics will include:
   - Knobology
   - Ultrasound physics
   - Evidence based bedside ultrasound practices
   - Advanced bedside ultrasound exams

B. Procedural experience overview:
   a. Fellows will log procedures and complete the quality assessment documentation at the bedside or following completion. Faculty will complete the quality verification following fellow documentation.
   b. Specific procedure requirements include:
      i. **Cardiac Exam (50 studies) -** In order to meet requirements the studies must include the following views:
         1. Parasternal long axis
         2. Parasternal short axis
         3. Apical 4 chamber view
         4. Subxiphoid
         5. Subcostal long axis inferior vena cava
      ii. **Pleural/Pulmonary (30 Studies) -** In order to meet requirements the studies must include assessment for the following (note positive and negative findings fulfil requirement) at 4 points on each hemithorax (8 views total)
         1. Presence and characteristics (complicated/uncomplicated) pleural effusion(s)
         2. Presence of lung sliding
         3. Consolidation
         4. An assessment of normal or abnormal abundance of B lines
      iii. **Focused Abdominal Ultrasound (30) -** In order to meet requirements the studies must include the following views:
         1. Cardiac- most commonly subxiphoid however parasternal view may be used if subxiphoid is uninterpretable
            a. Pericardium (presence or absence of pericardial effusion)
            b. Chambers including RV
         2. Right Upper Quadrant
            a. Right kidney (assessment for hydroureter or structural abnormalities)
            b. Hepatorenal recess
            c. Right lower thorax
         3. Left Upper Quadrant

a. Left Kidney (assessment for hydroureter or structural abnormalities)
b. Splenophrenic interface
c. Splenorenal interface

4. Pelvic
    a. Bladder
    b. Male: Rectovesical pouch (when bladder not decompressed)
    c. Female: Rectouterine pouch
5. Abdominal Aorta
    a. Long access view at approximate level of renal arteries

iv. **Vascular Ultrasound (30) -** In order to meet requirements the studies must include the following views for both right and left extremity (if present).

1. Common femoral vein with compression
2. Common femoral vein at level of saphenous intersection with compression
3. Superficial femoral vein with compression
4. Popliteal vein (above and below level of trifurcation) with compression

Education session goals & objectives

Pulmonary and Critical Care Case Conference
PCCM Grand Rounds - Thursdays at noon

Objectives

To provide trainees opportunity to present pulmonary and critical care hospital consultations for peer review. To provide trainees the opportunity to learn presentation skills. To learn the pathophysiology, diagnosis and management of patients hospitalized with pulmonary disease and critical illnesses. To review historic and current literature relevant to the cases presented for discussion.

Educational Experience

This once monthly conference will focus on inpatient pulmonary and critical care medicine consultations. The educational objectives will be obtained by the following methods:

1. The inpatient consultation service will select 2-3 cases for presentation.
2. Cases will be presented and relevant laboratory and radiographic material will be available for review.
3. Following each case presentation, a discussion of the relevant literature will take place
4. A reference list or copies of relevant articles should be available for distribution at the conference for all participants.

Evaluation and Feedback

Fellow presentations will be critiqued by faculty members present at the time of presentation. This will include feedback on content and presentation.

General Guidelines

The trainees and/or faculty members responsible for the inpatient pulmonary consultation service are expected to prepare and present this conference. It is expected that trainees will present a minimum of six conferences in the course of the training program

Pulmonary Pathology-Radiographic Correlation

PCCM Grand Rounds – 1st Thursday at noon

Objectives

To provide trainees didactic training in lung pathology. To understand the radiographic correlates in lung pathology

Educational Experience

This once monthly conference is a multidisciplinary conference directed at learning lung pathology and the radiographic correlates. The pulmonary division will present three cases and a chest radiologist will discuss the radiographic features. The pathologist will then show the corresponding pathology and discuss the pathologic features as well as relevant diagnostic techniques such as special stains. Trainees are encouraged to bring journal articles relevant to their cases for group discussion.

General Guidelines

A designated trainee will coordinate the pathology/radiology conference.

Pulmonary and Critical Care Teaching Conferences

Mondays 12-1p

Goal

To provide specific, detailed knowledge of critical care medicine topics.

Objectives

To provide education in the basic science and the physiology of critical care medicine. To provide instruction in specific multidisciplinary critical care medicine topics. To provide education in the indications, contraindications, and complications of common ICU procedures.

Educational Experience

All pulmonary/critical care fellows will attend a series of weekly hour-long seminars given by faculty members of the Pulmonary/Critical Care Division as well as by faculty in other related disciplines such as Medicine subspecialties, Surgery, Anesthesia and Obstetrics/Gynecology. The outline for these topics, to be completed over 2 years, is as follows (~75 lectures):

Critical Care Topics:

Cardiovascular Disease • cardiopulmonary resuscitation • cardiogenic shock • myocardial infarction • arrhythmias • pericardial and valvular diseases • cardiomyopathy • hypertensive crisis • vascular emergencies • hemodynamic monitoring/temporary pacers	***Endocrine/Dermatologic Diseases*** • thyroid – myxedema, storm, sick euthyroid • adrenal crisis, pheochromocytoma • diabetes: DKA, HNK • nutrition • TEN, Stevens-Johnson	***Gastrointestinal Diseases*** • upper and lower GI bleeding • acute pancreatitis • acute hepatic failure • acute biliary disease • acute inflammatory bowel disease • acute vascular bowel disease • toxic megacolon • acute perforations, ruptures	***Ethical, administrative issues*** • ethical and legal considerations • psychosocial aspects of critical illness • JCAHO guidelines
Respiratory Disease • acute respiratory failure • status asthmaticus • pneumonia • pulmonary, air embolism • aspiration, chemical pneumonitis, drowning, smoke inhalation/burns • hemoptysis • mechanical ventilation and monitoring • upper airway obstruction • pulmonary hypertension	***Infectious Diseases*** • sepsis, septic shock • antimicrobials • immunocompromised hosts (including AIDS) • nosocomial infections • community-acquired (toxic shock, meningococcus, SBE)	***Genitourinary, obstetric-gynecologic diseases*** • obstructive uropathy • urinary tract bleeding • complications of pregnancy (toxemia, etc.)	***Poisonings*** • acetominophen, aspirin, alcohol, cocaine TCA, MAO, neuroleptic, opiates • other – carbon monoxide
Renal Disease • acute renal failure • acid-base disorders • metabolic derangements (Ca++, Mg++, etc.) • dialysis	***Hematologic Diseases*** • acute coagulation defects • anticoagulation, fibrinolytic therapy • acute hemolytic disorders (including sickle cell) • acute neoplastic crisis'	***Surgical issues*** • head trauma • chest trauma • abdominal trauma • skeletal trauma	***Monitoring*** • hemodynamic • cerebral • respiratory • metabolic • imaging

	• blood component therapy		• biomechanics
Neurologic Disease • coma • seizures • Myasthenia, Guillaine-Barre • cerebral vascular disease • crush injury • burns • necrotizing fasciitis, soft-tissue infections • transplant issues	***Rheumatologic*** • vasculitis	***Anesthesia issues*** • airway maintenance • paralytics • perioperative complications	

Pulmonary Topics

Airway diseases • Asthma • COPD • Bronchiolitis • Cystic fibrosis	***Malignancy*** • Bronchogenic carcinoma • Metastatic disease • Carcinoid, tracheal tumors, etc	***Pleural disease*** • Empyema • Malignancy • Other etiologies: asbestos, collagen vascular disease, Dressler's
Parenchymal diseases • IPF • DPLD (occupational/environmental, collagen vascular, other (sarcoid, LAM, EG, HSP, etc.)	***Infections*** • Pneumonia • Immunocompromised hosts • TB, atypical mycobacterial disease	***Occupational/environmental disease*** • Occupational disease • Drug-induced lung disease ***Mediastinal disorders***
Vascular diseases • Pulmonary hypertension • Vasculitis, alveolar hemorrhage • Pulmonary embolism	***Lung Injury*** • ARDS • Radiation, inhalation, trauma	***Pulmonary manifestations of systemic disease and pregnancy*** • Collagen vascular disease • Sepsis, endocarditis • Renal, hepatic disease • Pregnancy
Pulmonary physiology • PFT's • Exercise testing ***Pulmonary rehabilitation***	***Pulmonary radiology*** • CXR • CT • Nuclear ***Other: Angio, PET, MRI***	***Pulmonary pathology*** ***Pulmonary procedures*** ***Respiratory care*** ***Sleep medicine*** • Physiology • Sleep-testing ***Clinical disorders***

Lung Cancer Multidisciplinary Clinic

Mondays 1p-2p, Zoom

Goal

To understand the evaluation and management of chest tumors from a multidisciplinary perspective

Objectives

To understand the diagnostic evaluation of patients with chest tumors. To understand the indications for and limitations of diagnostic studies in the evaluation of chest tumors. To understand lung cancer staging and implications for treatment. To develop professional skills in working with colleagues in other disciplines.

Educational Experience

This conference is held weekly in the radiology department. The multidisciplinary team comprises chest radiologists, thoracic surgeons, medical oncologists, radiation oncologists and pulmonologists. The physician submits cases in advance for presentation. The diagnostic strategy and management is discussed. Further diagnostic studies or treatment is then planned based on the group consensus. Time for follow-up reports on patient progress is provided. Patients with lung cancer are staged and entered into the tumor registry based the recommendations of this conference. Fellows are expected to present pertinent cases and follow-up on the recommendations made at the conference. The Multidisciplinary Lung Tumor Clinic immediately follows from 2-5 pm.

Pulmonary Outpatient Conference

Wednesdays 12-1p

Goal

To improve clinical practice and medical knowledge by provide an overview of the management of clinical conditions seen in the outpatient setting

Objectives

Understand the diagnosis, evaluation, and management of common outpatient pulmonary conditions including:

- COPD
- Asthma
- RADS
- IPF and other interstitial lung diseases
- Lung transplant and pulmonary complications of other transplants
- Pulmonary infections including mycobacterial diseases
- Cystic fibrosis
- Neuromuscular respiratory weakness
- Chronic cough
- Lung nodules
- Pulmonary hypertension
- Preoperative assessment
- Asbestos and asbestos related pulmonary disease
- Obesity hypoventilation syndrome
- Nicotine addiction

Educational Experience

The conference will be held on Wednesdays prior to conference. Attendance for all fellows who are attending clinic is required. The session will be lead by a clinic preceptor.

Pulmonary & Critical Care Journal Club

PCCM Grand Rounds - 4th Thursday

Goal

To provide an educational experience in literature review relevant to pulmonary medicine.

Objective

To provide trainees a review of current literature in Pulmonary and Critical Care Medicine. To provide trainees an understanding of statistical methodology used in research articles. To develop skills in evaluating the quality of published pulmonary and critical care literature.

Educational Experience

This conference will be held once per month. Fellows are expected to present 1 or 2 articles for detailed review. Assigned trainees will select the article(s) at least 2 weeks prior to the scheduled conference. A faculty member must be assigned to review the article with the trainee prior to the conference presentation. The trainee will present the journal article(s) at the conference and lead the discussion. Each trainee will present at this conference 2 times per year. Faculty and Fellow attendance is mandatory.

Evaluation and Feedback

Fellow presentations will be critiqued informally by faculty members present at the time of presentation. This will include feedback on content and presentation.

The program director will monitor the quality of the conference series. The program director will formally review this educational program semiannually with the fellows and the faculty.

General Guidelines

Journal club is held on the 4th Thursday of each month during Grand rounds. Fellows should submit articles to the Program Coordinator for distribution 2 weeks prior to the conference.