Rotation Goals and Educational Purpose

Pulmonary medicine encompasses the diagnosis and treatment of a broad range of disorders that involve not only the respiratory system, but may also arise in different organ systems. By virtue of presenting complaints, the pulmonologist must also be well-versed in disorders of the cardiovascular, gastrointestinal, and rheumatologic systems that may mimic pulmonary disease. Many patients with chronic pulmonary disorders are encountered and managed in the clinic, and the management of these patients differs greatly from typical inpatient pulmonary and critical care medicine practices.

The general internist needs to have competency in the initial diagnosis and management of acute pulmonary disorders as well as long-term management of chronic disease. Disorders such as chronic cough, asthma, COPD, and dyspnea are among the most common seen by general internists and therefore require mastery early in the internist’s career. Interpretation of common studies, such as chest x-rays and spirometry, will be expected of the general internist. More uncommon disorders, such as interstitial lung diseases, cystic fibrosis, and pulmonary vasculitis syndromes, may be encountered only during training or a handful of times during a career; however, having an index of suspicion is critical for timely referral to a specialist. Finally, a working knowledge of medications used in the care of patients with pulmonary disorders is critical for the internist, since these physicians often coordinate patient care and will undoubtedly be asked to assess for potential side effects.

For the above reasons, rather than providing a ‘laundry-list’ of all pulmonary disorders a general internist might encounter, this curriculum will instead highlight:
   a) common ambulatory pulmonary disorders;
   b) interpretation of pulmonary function test and plain chest radiographs;
   c) pulmonary pharmacology; and
   d) identification and early work-up of uncommon pulmonary disorders in which mastery is expected by the completion of residency

This rotation is currently incorporated into the Ambulatory Care rotation for all house officers, and encompasses a single ½ day clinic weekly.

Rotation Competency Objectives
As a supplement to the University of Michigan Longitudinal Learning Objectives, the following provides a broad overview of the ACGME General Competencies specific to this rotation:

I. Patient Care – By completion of the rotation, residents will be able to:
   a. Perform a Pulmonary-directed History & Physical examination:
      i. Elicit history, temporal course, pattern, severity, and functional impact of:
         1. Dyspnea
         2. Cough
         3. Chest Pain
      ii. Identify and recognize severity of “classic” physical findings:
         a. Inspection
            i. Clubbing
            ii. Chest AP diameter
            iii. Cyanosis
            iv. Pursed-lip breathing
            v. Accessory muscle use
            vi. Scarring
         b. Auscultation
            i. Vesicular breath sounds
            ii. Bronchial breath sounds
            iii. Wheezing
            iv. Crackles/rales
         c. Percussion
            i. Dullness
            ii. Hyperresonance
         d. Palpation
            i. Chest wall deformities
            ii. Egophony
      iii. Identify and recognize severity of associated “non-pulmonary” physical findings:
         1. Lower/upper extremity edema – pulmonary hypertension, PE, fibrosing mediastinitis, SVC syndrome
         2. S3, S4 gallops – pulmonary hypertension, PE, diastolic dysfunction
         3. Abdominal distension – hepatic disease with hepatopulmonary syndrome, hepatic hydrothorax
         4. Skin abnormalities – sarcoidosis, dermatomyositis, scleroderma
         5. Joint abnormalities – connective tissue disorders, sarcoidosis, collagen vascular diseases
   b. Understand indications and limitations of, and appropriately order/interpret, imaging studies, pulmonary function studies, and procedures
      i. Radiology:
         a. Chest x-ray: PA/Lateral
         b. Chest CT (conventional, HRCT, volumetric 3D reconstruction, nodule-protocol, PE-protocol)
         c. PET scanning
d. Other (thoracic ultrasound, MRI, etc.)

ii. Pulmonary Function Studies
   a. Spirometry
   b. DLCO
   c. Full pulmonary function studies (with lung volumes)
   d. Six-minute hallwalk/O2 titration
   e. Cardiopulmonary exercise testing (indications for ordering only)
   f. Arterial blood gases
   g. Maximal respiratory pressures

iii. Procedures:
   a. Bronchoscopy
      i. Transbronchial biopsy
      ii. Endobronchial biopsy
      iii. Transbronchial needle aspiration
      iv. EBUS
      v. Super-Dimension
      vi. Bronchoalveolar lavage
   b. Pleurodesis
   c. Transthoracic needle aspiration
   d. Thoracentesis
   e. Closed pleural biopsy
   f. VATS

iv. Pulmonary rehabilitation

c. Formulate appropriate plans of care:
   i. Integrate subjective and objective information
   ii. Determine next steps for diagnosis
   iii. Order appropriate therapeutics

II. Medical Knowledge – By completion of the rotation, residents should be able to:
   a. Pharmacology: Discuss the indications, usage, and major side effects of drugs commonly used to manage pulmonary disorders:
      i. Inhalers
         a. Corticosteroids
         b. β2-agonists (short- and long-acting)
         c. Anti-cholinergics (short- and long-acting)
         d. Combined therapies
      ii. Systemic medications
         a. Corticosteroids
         b. Immunosuppressants (anti-malarials, cytotoxic agents, antimetabolites, biologic agents)
         c. Leukotriene antagonists
         d. Antimicrobials

   b. Clinical pathology: demonstrate knowledge sufficient for basic interpretation of pertinent laboratory studies
i. Pulmonary function studies
   a. Obstruction
   b. Restriction
   c. Neuromuscular disease

ii. 6-minute hallwalk

iii. Chest X-ray

iv. HRCT
v. BAL fluid studies (cell count, differential, pathologic interpretation)
vi. Pleural fluid analysis

III. Interpersonal and Communication Skills – By completion of the rotation, residents should be able to:
   a. Recognize the importance of patient education in the treatment of pulmonary disorders, including smoking cessation, pulmonary rehabilitation, and appropriate use of oxygen.
   b. Demonstrate communication skills (including listening) that support respectful, culturally competent, and patient-centered care.
   c. Demonstrate verbal and nonverbal communication that compassionately recognizes the impact of chronic dyspnea and fatigue on family and workplace.
   d. Dictate outpatient consultation notes to referring physicians that focus succinctly on patient issues and recommendations for care.

IV. Professionalism – By completion of the rotation, residents should be able to:
   a. Respectfully and compassionately respond to patients with a multitude of phenotypic expressions of pulmonary disorders.
   b. Compassionately respond to socio-behavioral and psychiatric complexities of pulmonary conditions.
   c. Engage patients in effective informed voluntary consent for planned medical management and interventions.
   d. Understand confidentiality with respect to chronic illness.
   e. Actively participate in clinics and create medical records in a timely fashion

V. Practice-Based Learning and Improvement – By completion of the rotation, residents should be able to:
   a. Utilize information technology to enhance patient education.
   b. Demonstrate willingness to learn from error, use information technology to support self-education (literature review), and facilitate learning of others.
   c. In response to measures of quality care, personally monitor and strive to improve skills necessary for optimal management of rheumatologic patients.
   d. Identify personal areas of knowledge and/or examination skill weaknesses, and seek out clinical opportunities to develop/expand them.

VI. Systems-Based Practice – By completion of the rotation, residents should be able to:
   a. Appropriately refer patients for pulmonary rehabilitation.
   b. Appropriately consult and coordinate with non-medical services
   c. Strive to provide cost-effective care
   d. Strive to assist patients in navigating systems of chronic care.
**Teaching Methods**

I. Supervised Patient Care:
   a. The emphasis of the rotation is on experiential learning through consultative management of outpatients. The rotation is 100% outpatient, with clinics located in the A. Alfred Taubman Health Care Center and the Pulmonary Clinic at the Briarwood Campus.

II. Independent study:
   a. Core Clinical Journals
      i. American Journal of Respiratory and Critical Care Medicine
      ii. CHEST
      iii. New England Journal of Medicine
   b. Texts and Manuals
      i. Murray and Nadel. *Textbook of Pulmonary Medicine*
      ii. Fraser and Paré. *Diagnosis of Diseases of the Chest*
      iii. Schwarz and King. *Interstitial Lung Disease*

**Evaluation Methods**

Given the short duration of the elective, formative face-to-face feedback to residents will occur after each clinic session by the supervising attending and again at the end of the rotation. Attending physicians also complete online competency-based evaluations of each resident. The evaluation is shared with the resident, is available for on-line review by the resident at his/her convenience, and is sent to the residency office for internal review. The evaluation is part of the resident file and is incorporated into semiannual performance reviews for directed resident feedback. Because feedback works best when it is bi-directional, residents also complete a service evaluation of the rotation faculty monthly, and should feel free to provide verbal feedback to the Attending Physician.

**Suggested Reading**

**Asthma**


3. Chauhan BF, Ducharme FM. Anti-leukotriene agents compared to inhaled corticosteroids in the management of recurrent and/or chronic asthma in adults and children. *Cochrane Database Syst Rev.* 2012 May 16;5:CD002314.
COPD


Pulmonary Nodules/Lung Cancer


Dyspnea

Cough


Interstitial Lung Disease


Pneumonia

