**Update on Chronic Obstructive Pulmonary Disease**

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**Background:** chronic obstructive pulmonary disease (COPD) common, preventable, and treatable; Global Initiative for Chronic Obstructive Lung Disease (GOLD) defines COPD as condition characterized by persistent airflow obstruction (fully reversible, especially in earlier stages); COPD usually progressive, associated with enhanced chronic inflammatory response in airways, and primarily initiated by noxious particles (tobacco smoke in ≥80% of cases in United States); exacerbations and comorbidities account for majority of health care costs and treatment of COPD

**Diagnosis:** sensitivity and specificity for COPD on physical examination (PE) extremely low; patients with more advanced disease can have decreased breath sounds and prolonged expiration; wheezing, rales, and rhonchi not heard in persons without exacerbations; forced expiration after deep breath recommended as test for office diagnosis; listen to trachea; if patient exhales for >6 sec, COPD likely; audible exhalation >10 sec indicates presence of disease, but obtain spirometry for confirmation; spirometry — not recommended as screening test for all individuals or only smokers; recommended for symptomatic patients (i.e., those with cough and sputum production or dyspnea) and individuals with exposure to noxious particles and other comorbidities

Impact of early diagnosis on outcomes: studies clearly show smoking cessation even at early stages of COPD significantly slows decline of lung function; data less clear on whether early detection of COPD with spirometry increases likelihood of smoking cessation, but speaker believes it can be used to motivate patients

**Spirometric classification of COPD:**

- **Normal** — defined in guidelines by GOLD and COPD Foundation as ratio of forced expiratory volume in first second of expiration to forced vital capacity (FEV1/FVC) ratio >0.7 and FEV1 ≥80% predicted; grade 1 (mild) — defined by GOLD guidelines as FEV1/FVC ratio <0.7 and FEV1 ≥80% predicted, and by COPD Foundation guidelines as FEV1/FVC ratio <0.7 and FEV1 ≥60% predicted; grade 2 (moderate) — defined by GOLD guidelines as FEV1 50% to 80% predicted, and by COPD Foundation guidelines as FEV1 30% to 60% predicted; grade 3 (severe) — defined by GOLD guidelines as FEV1 30% to 60% predicted, and by COPD Foundation guidelines as FEV1 <30% predicted; grade 4 (very severe) — defined by GOLD guidelines as FEV1 <30% predicted; FEV1 used to define COPD, but not clear predictor of patient’s health status

**Hyperinflation in COPD:** individuals with given FEV1 may have different degrees of lung hyperinflation; as obstruction increases and lung compliance lost, patient unable to adequately exhale; as result, end expiration continues to rise; residual volume after forced expiration (rather than FEV1) much more tightly correlated to symptoms; dynamic hyperinflation during exercise — as patient exercises, respiratory rate increases and expiratory time decreases; less time to exhale results in trapping of air, leading to dynamic hyperinflation

**Systemic consequences and comorbidities of COPD:** include physical deconditioning, exercise intolerance, skeletal muscle dysfunction, osteoporosis, atherosclerotic cardiovascular disease, diabetes mellitus, metabolic syndrome, anemia, anxiety, depression, and lung cancer; with exception of those with advanced-stage disease, patients with COPD tend to die more often of comorbidities

**Treatment of COPD:** goals — relief of symptoms; prevention of exacerbations, progression of disease, decline of lung function, and mortality from COPD

Medications: short-acting bronchodilators include albuterol and ipratropium; useful on as-needed basis for alleviation of symptoms; long-acting β-agonists (LABAs) — most commonly used in combination with inhaled corticosteroids (ICS), but can be used alone in treatment of COPD; include formoterol, salmeterol, and indacaterol (Arcapecta Neohaler; once-daily dosing; usually tier III medication); other LABAs pending approval by Food and Drug Administration (FDA); long-acting anticholinergics include tiotropium and aclidinium (Tudorza Pressair); theophylline now used as third-line drug (has anti-inflammatory and bronchodilator properties; can complement long-acting

**Educational Objectives**

The goal of this program is to improve the diagnosis and management of chronic obstructive pulmonary disease (COPD) and mimickers of asthma. After hearing and assimilating this program, the clinician will be better able to:

1. Prescribe effective medical therapy for patients with COPD.
2. Consider the use of phosphodiesterase-5 inhibitors in the management of a patient with COPD who is unresponsive to other treatments.
3. Identify the various conditions that can mimic asthma.
4. Summarize the diagnostic criteria for extrinsic allergic alveolitis.
5. Initiate appropriate treatment for aspirin-exacerbated respiratory disease, extrinsic allergic alveolitis, Churg-Strauss syndrome, acute bronchopulmonary aspergillosis, and vocal cord dysfunction.

**Faculty Disclosure**

In adherence to ACCME Standards for Commercial Support, Audio-Digest requires all faculty and members of the planning committee to disclose relevant financial relationships within the past 12 months that might create any personal conflicts of interest. Any identified conflicts were resolved to ensure that this educational activity promotes quality in health care and not a proprietary business or commercial interest. For this program, the following has been disclosed: Dr. Sciurba is a Data Safety Monitoring Board Consultant for Boehringer Ingelheim GmbH, and has received research support from Actelion Pharmaceuticals, Boehringer Ingelheim GmbH, Forest Laboratories, GlaxoSmithKline, Novartis AG, Pearl Therapeutics, Pfizer, and PneumRx. Dr. Bowling and the planning committee reported nothing to disclose. In his lecture, Dr. Sciurba presents information that is related to the off-label or investigational use of a therapy, product, or device.
bronchodilators in patients with more advanced COPD (titrate to 8-12 μg/mL)

Effect of long-acting bronchodilators on dynamic hyperinflation: study comparing tiotropium with placebo in patients with COPD found use of drug associated with reductions in dynamic lung hyperinflation and improvements in exercise endurance

Effect of fluticasone/salmeterol (Advair) on exacerbations of COPD: study comparing fluticasone/salmeterol to salmeterol alone found combination agent associated with ≥30% greater reduction in moderate to severe exacerbations of COPD over 1 yr

Effect of phosphodiesterase-4 (PDE-4) inhibitor (roflumilast) in COPD: drug approved by FDA only for reduction of exacerbations (no indication for bronchodilation); achieves ≈17% reduction compared to placebo; should be used only in patients with bronchitis, frequent exacerbations, and FEV₁ < 60% predicted; side effects include diarrhea and weight loss

COPD Foundation guidelines for treatment: if patient has symptoms and low FEV₁, start with LABA, long-acting anticholinergic, or both; if exacerbations present, consider starting with LABA plus ICS; in patient with more advanced COPD and frequent exacerbations, triple therapy (LABA and long-acting anticholinergic plus ICS) often used

Non-FDA-approved interventions: recent clinical trial showed daily azithromycin (250 mg) can reduce exacerbations in patients with difficult COPD by ≈27%; must be aware of potential side effects of hearing difficulties and QT prolongation; otherwise well tolerated; PDE-5 inhibitors (eg, sildenafil, tadalafil) worth considering in patients unresponsive to other treatments

Lung-volume reduction surgery: proven to prolong and improve life in selected patients with advanced emphysema; minimally invasive bronchoscopic approaches currently under investigation

### Asthma Mimickers

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**Prevalence and burden of asthma:** extremely common and prevalence increasing; accounts for >25% of visits to emergency department annually, ≈479,000 hospitalizations, and 10 million outpatient visits; black women 2.5 times more likely than whites to have chronic inflammatory condition characterized by Samter triad (sensitivity reaction that occurs when bronchi become colonized by Aspergillus; extremely common in patients with cystic fibrosis (can also occur in persons with asthma); inflammatory allergic condition in response to proteins on aspergillus; repeated episodes of airway inflammation and dilation lead to bronchiectasis, mucoid impaction, bronchial obstruction, and respiratory compromise; sepiated hyphae with dichotomous branching may be seen in mucus; cultures can be positive for Aspergillus in some patients, but condition not infectious; physiology — no relationship between intensity of airborne exposure and rates of sensitization; healthy individuals can eliminate fungal spores; atopic individuals may form IgE and IgG antibodies; clinical features — signs and symptoms include asthma, bronchial obstruction, fever, malaise, expectation of brownish mucous plugs, eosinophilia, hemoptysis, and wheezing; predominantly affects upper lobes of lungs; radiologic features include “tram lines,” “gloved finger shadows,” and cylindrical bronchiectasis; pulmonary function tests (PFTs) show airflow obstruction, trapping of air, positive bronchodilator response (in some patients), mixed restriction and obstruction (if
fibrosis present), and reduced defusing capacity for carbon monoxide; clues to diagnosis — history of asthma; expectation of mucus; peripheral blood eosinophilia; elevated IgE and IgG antibodies to *A fumigatus*; ABPA vs asthma — ABPA present in 6% to 30% of patients with asthma with skin test reactivity to *Aspergillus*; features of ABPA may be common in persons with asthma but no ABPA; treatment — first-line therapy corticosteroids; addition of itraconazole may augment activity of methylprednisolone and reduce *Aspergillus*-specific IgG antibodies, but not first-line therapy

**Paradoxical vocal fold movement:** also called vocal cord dysfunction; defined as inappropriate adduction of vocal folds during inhalation; folds can close completely or partially during inhalation and/or exhalation; prevalence predominantly in women; may be coexistent with asthma in ≤20% of patients; may be precipitated by emotional events; occurs with and without organic conditions; may be due to — gastroesophageal reflux; psychogenic stridor; respiratory-type laryngeal dystonia; drug-induced laryngeal dystonic reactions; asthma-associated laryngeal dysfunction; abnormalities that affect brainstem; signs and symptoms — include sensation of throat being closed, dramatic episodes of difficulty with breathing, stridor, shortness of breath, and wheezing; PFTs show fixed airflow obstruction; triggers — include shunting or coughing, physical exercise, acid reflux, breathing cold air, irritants, and psychosocial or neurologic issues; diagnosis — based on patient history and PE (including examination of vocal cords); if patient experiencing episode, ask him or her to pant (resolves condition); laryngoscopy crucial for making diagnosis; condition intermittent and resolves immediately on intubation; other causes of laryngeal obstruction include laryngeal stenosis and bilateral vocal fold paralysis; treatment — largely behavioral; refer patient to speech therapist; heliox can be used for severe symptoms, but condition mostly managed with psychologic intervention

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**Suggested Reading**

1. Spirometry is recommended as a screening test for chronic obstructive pulmonary disease (COPD) in all patients with a history of past and/or present tobacco use.
   (A) True (B) False

2. Moderate (grade 2) COPD is defined by the Global Initiative for Chronic Obstructive Lung Disease (GOLD) guidelines as a forced expiratory volume in the first second of expiration (FEV₁) _______ of predicted, but by the COPD Foundation guidelines as FEV₁ _______ of predicted.
   (A) ≥80%; ≥60% (C) 50% to 80%; 30% to 60%
   (B) ≥60%; ≥80% (D) 30% to 60%; ≥50%

3. Theophylline is currently used as a _______ drug in the treatment of COPD.
   (A) First-line (B) Second-line (C) Third-line

4. Which of the following medications is approved by the Food and Drug Administration (FDA) for reduction of exacerbations of COPD, but not for bronchodilation?
   (A) Albuterol (B) Salmeterol (C) Tiotropium (D) Roflumilast

5. Which of the following treatment options for COPD is not approved by the FDA?
   (A) Indacaterol (B) Tadalafil (C) Terbutaline (D) Aclidinium

6. Which of the following is considered the gold standard for treatment of asthma and lung problems in a patient diagnosed with aspirin-exacerbated respiratory disease?
   (A) Leukotriene antagonists (C) Long-acting β-agonists
   (B) Inhaled corticosteroids (D) Omalizumab (anti-IgE therapy)

7. All the following are main criteria for diagnosis of extrinsic allergic alveolitis, except:
   (A) Hypoxia during rest (C) Dyspnea and fatigue
   (B) Findings on chest x-ray (D) Exposure to organic dust

8. A patient who presents with asthma, eosinophilia, neuropathy, nonfixed pulmonary infiltrates, and paranasal sinus abnormalities is most likely to have which of the following conditions?
   (A) Acute bronchopulmonary aspergillosis (C) Extrinsic allergic alveolitis
   (B) Aspirin-exacerbated respiratory disease (D) Churg-Strauss syndrome

9. Identify the incorrect statement about acute bronchopulmonary aspergillosis.
   (A) Extremely common in patients with cystic fibrosis
   (B) Cultures can be positive for Aspergillus but condition is not infectious
   (C) Predominantly affects upper lobes of the lungs
   (D) First-line therapy is itraconazole

10. Laryngoscopy is crucial for making a diagnosis of paradoxical vocal fold movement.
    (A) True (B) False