Hospital Discharge of Patients with COPD:
Reducing Risk for Future Exacerbations and Readmission

Friday, December 12, 2014
6:30 AM – 8:00 AM

South Seas F, Level 3
Mandalay Bay South Convention Center
3950 South Las Vegas Boulevard
Las Vegas, NV 89119

Sponsored by Integrity Continuing Education, Inc.
Supported by an educational grant from Sunovion Pharmaceuticals, Inc.
Hospital Discharge of Patients with COPD: Reducing Risk for Future Exacerbations and Readmission

Faculty Panel

Patrick J. Dunne, MEd, RRT, FAARC
Clinical Application Specialist
HealthCare Productions, Inc.
Fullerton, California

Stanley B. Fiel, MD, FACP, FCCP
Professor of Medicine
Mount Sinai School of Medicine
New York, New York
The deNeufville Professor
Chairman, Department of Medicine
Morristown Medical Center
Morristown, New Jersey

Agenda

6:00 AM - 6:30 AM  Registration/Breakfast Served
6:30 AM - 7:45 AM  Practitioner’s Edge Scientific Session
7:45 AM - 8:00 AM  Question & Answer Session/Closing Remarks

Target Audience

This activity has been designed for respiratory therapists involved in the management of patients with chronic obstructive pulmonary disease (COPD).

Learning Objectives

Upon completion of this educational activity, participants should be able to:

- Identify guideline-recommended objective measures for assessing current disease severity and risk for worsening disease and future exacerbations
- Provide appropriately individualized therapeutic recommendations, education, and training for patients following hospitalization for an acute COPD exacerbation
- Identify nonpharmacologic strategies for long-term management of COPD and the associated benefits to health outcomes
- Describe comorbidities that impact risk for worsening disease and future exacerbations in patients with COPD

American Association for Respiratory Care (AARC) Continuing Education

This program has been approved for a maximum of 1.50 contact hours Continuing Respiratory Care Education (CRCE) credit by the AARC, 9425 N. MacArthur Blvd., Suite 100, Irving, TX 75063. Course #143434000.
Hospital Discharge of Patients with COPD: Reducing Risk for Future Exacerbations and Readmission

Physician Continuing Education

Accreditation Statement
Integrity Continuing Education is accredited by the Accreditation Council for Continuing Medical Education to provide continuing medical education for physicians.

Credit Designation
Integrity Continuing Education, Inc. designates this live activity for a maximum of 1.5 AMA PRA Category 1 Credits™. Physicians should claim only the credit commensurate with the extent of their participation in the activity.

Disclosure of Conflicts of Interest (COI)

Integrity Continuing Education, Inc. requires instructors, planners, managers, and other individuals who are in a position to control the content of this activity to disclose any real or apparent COI they may have as related to the content of this activity. All identified COI are thoroughly vetted by Integrity Continuing Education, Inc. for fair balance, scientific objectivity of studies mentioned in the materials or used as the basis for content, and appropriateness of patient care recommendations.

The faculty reported their financial relationships or relationships to products or devices they or their spouse/life partner have with commercial interests related to the content of this CME activity in their individual biographies. Please see the faculty biographies.

Patima Tanapat, PhD, hereby states that she or her spouse/life partner do not have any financial relationships or relationships to products or devices with any commercial interest related to the content of this activity of any amount during the past 12 months.

Disclosure of Unlabeled Use

This educational activity may contain discussion of published and/or investigational uses of agents that are not indicated by the US Food and Drug Administration. Integrity Continuing Education, Inc. and Sunovion Pharmaceuticals, Inc. do not recommend the use of any agent outside of the labeled indications.

The opinions expressed in the educational activity are those of the faculty and do not necessarily represent the views of Integrity Continuing Education, Inc. or Sunovion Pharmaceuticals, Inc. Please refer to the official prescribing information for each product for discussion of approved indications, contraindications, and warnings.

Disclaimer

The information provided at this CME activity is for continuing education purposes only and is not meant to substitute for the independent medical judgment of a physician relative to diagnostic and treatment options of a specific patient’s medical condition.
Patrick J. Dunne, MEd, RRT, FAARC
Clinical Application Specialist
HealthCare Productions, Inc.
Fullerton, California

Patrick J. Dunne, a registered respiratory therapist, is President/CEO of HealthCare Productions, Inc., a California-based professional services corporation providing educational and training services to healthcare providers and professional associations nationwide. Prior to establishing HealthCare Productions in 2001, Patrick served as Regional President and Director of Corporate Compliance for a 19-location, full-service regional provider of home medical and respiratory therapy equipment services.

Before entering the home care sector in 1983, Patrick was involved in respiratory care education at the college level. In that capacity he served, at varying times, as a classroom instructor, clinical coordinator, and program director. In addition to his classroom and clinic responsibilities, Patrick was also involved in curriculum development, programmatic accreditation, and academic affairs. From 1979 to 1983, as a Trustee of the National Board for Respiratory Care, he was instrumental in the development and implementation of standardized national credentialing examinations for the competency testing of respiratory therapists.

Following several years of voluntary work in the House of Delegates and on the Board of Directors, in 1991 Patrick was elected to serve as President of the American Association for Respiratory Care (AARC). Since that time, Patrick has continued to serve the AARC in various capacities, presently serving as a Trustee of the American Respiratory Care Foundation, the philanthropic subsidiary of the AARC, and as a member of the 2010 Program Committee. Additionally, Patrick continues to serve as the Governor (USA) on the International Council for Respiratory Care (ICRC), a multinational organization of respiratory clinicians dedicated to the globalization of quality respiratory care. He was elected to the Executive Committee of the ICRC in 2008.

In 1992, Patrick was appointed to a 4-year term on the Joint Commission on Accreditation of Healthcare Organizations Home Care Professional-Technical Advisory Committee, after serving as a part-time home care surveyor/consultant from 1988 to 91. Between 2002 and 2007, Patrick served on the Board of Review of the Community Health Accreditation Program (CHAP), assuming a key role in the development of the 2004 CHAP Standards of Excellence for home medical equipment providers.

Patrick was an active participant in the Fifth (1999, Washington, DC) and Sixth (2005, Denver, CO) Long-term Oxygen Therapy (LTOT) Consensus Conferences, and has written extensively about the cost-effectiveness of properly prescribed and utilized LTOT in the management of COPD. More recently Patrick has become an outspoken advocate for the clinical and economic value of new “non-delivery” LTOT technology. He is also considered a leading expert on the technical and clinical aspects of the delivery of aerosolized medications, especially as delimited in the most current NAEPP and GOLD Guidelines.
Hospital Discharge of Patients with COPD: Reducing Risk for Future Exacerbations and Readmission

Patrick attended the University of California Los Angeles where he earned both his undergraduate (1974) and graduate (1979) degrees. He is also a graduate (1964) of the Respiratory Care Program at the Hospital of the University of Pennsylvania. Prior to resuming his post-secondary education in 1970, Patrick served a 4-year active duty tour as a hospital corpsman in the US Navy.

Patrick has conducted well-over 450 educational workshops/seminars/lectures throughout North America, Europe, and the Pacific Rim on topics related to chronic respiratory care, disease state management, and the value and utility of using evidence-based clinical protocols.

Patrick continues to publish in peer-review medical journals and various trade/industry publications, authoring over 75 articles or papers. He is co-author of the popular textbook Respiratory Home Care: The Essentials, published by F.A. Davis. He also served a 4-year term as a member of the editorial board of Respiratory Care, the official peer-review scientific journal of the AARC.

In 1998, Patrick was elected a Fellow of the AARC, and in 1999, he was the recipient of the Invacare/AARC Award for Excellence in Home Respiratory Care. In October 2000 Patrick was presented the Jimmy A. Young Medal, the AARC's highest award for meritorious career service.

Faculty Disclosure
Consultant: Monaghan Medical Corporation
Speakers bureau: MatureHealth
Hospital Discharge of Patients with COPD: Reducing Risk for Future Exacerbations and Readmission

Stanley B. Fiel, MD, FACP, FCCP
Professor of Medicine
Mount Sinai School of Medicine
New York, New York
The deNeufville Professor
Chairman, Department of Medicine
Morristown Medical Center
Morristown, New Jersey

Stanley B. Fiel, MD, is Chairman of the Department of Medicine at Morristown Memorial Hospital in Morristown, New Jersey, where he also serves as The deNeufville Professor. In addition, he is Professor of Medicine at Mount Sinai School of Medicine in New York, New York. Dr. Fiel is a distinguished physician and author of numerous published works on various topics relating to pulmonary and critical care medicine.

After receiving a Bachelor of Science degree in 1969 from the University of Connecticut, Dr. Fiel was awarded his Medical Degree and inducted into the Alpha Omega Alpha honor society at the Medical College of Pennsylvania in Philadelphia, Pennsylvania. He then completed an internship and residency at Temple University Hospital in Philadelphia and a fellowship in the pulmonary disease section of the Hospital of the University of Pennsylvania. Since 1978, Dr. Fiel has held key hospital appointments including Chief of the Division of Pulmonary/Critical Care Medicine at Drexel University College of Medicine and Hahnemann University in Philadelphia.

Dr. Fiel is a Fellow of the American College of Chest Physicians and the American College of Physicians. He also is a member of the American Thoracic Society and other professional societies. He currently serves or has served previously on the editorial boards for journals such as the Journal of Asthma, Chest, and Clinical Pulmonary Medicine. Dr. Fiel's many contributions to medical literature have appeared in publications such as The New England Journal of Medicine, the Journal of the American Medical Association, the American Journal of Respiratory and Critical Care Medicine, and Chest.

Dr. Fiel's major research interests include the mechanisms of inflammation in cystic fibrosis and therapeutic advances in the treatment of obstructive pulmonary disorders including asthma, cystic fibrosis, bronchiectasis, and COPD. He has published more than 150 articles in the medical literature.

Faculty Disclosure
Consultant: Bayer, Boehringer Ingelheim, Novartis, Pfizer, Vertex
Learning Objectives

- Identify guideline-recommended objective measures for assessing current disease severity and risk for worsening disease and future exacerbations
- Provide individualized therapeutic recommendations, education, and training for patients following hospitalization for a COPD exacerbation
- Identify nonpharmacologic strategies for long-term management of COPD and associated benefits to health outcomes
- Describe comorbidities that impact risk for worsening disease and future exacerbations in patients with COPD

COPD Is Underdiagnosed

- COPD is a common preventable and treatable disease
- Characterized by persistent airflow limitation that is usually progressive and associated with an enhanced chronic inflammatory response in the airways and the lung to noxious particles or gases
- Exacerbations and comorbidities contribute to the overall severity in individual patients

In 2011, 15 million people in the US were estimated to have COPD. However, lung function tests show that up to twice as many people may have COPD, but are undiagnosed.

Ed, emergency department.


Burden of COPD

- 3rd leading cause of death
  - 133,575 deaths from COPD in 2010
  - Mortality rate has declined in men and some age groups since 1999, but continues to rise in women

- Total economic cost estimate in 2010 was $50 billion
  - $30 billion in direct healthcare costs
  - $20 billion in indirect costs

- Annual visits for COPD to:
  - Physician: 16 million
  - ED: 2.3 million
  - Hospital: 1 million


Ongoing Efforts to Improve Diagnosis and Management of COPD

- US DHHS effort to promote respiratory health
  - Goals of the Healthy People 2020 Program
    - Increase the rate of COPD diagnosis
    - Improve activity of adults with COPD
    - Reduce ED visits, hospitalizations, and deaths from COPD

- Updates to CMS Readmissions Reduction Program
  - CMS will reduce payments to hospitals for COPD readmissions within 30 days
  - Maximum penalty at 3% of a hospital's Medicare reimbursement

CMS, Centers for Medicaid & Medicare Services; DHHS, Department of Health and Human Services.

Pathophysiological Features of Airflow Obstruction in COPD

Normal

Airway held open by alveolar attachments

COPD

Disrupted alveolar attachments (emphysema)

Mucosal inflammation, fibrosis

Mucus hypersecretion

Airway obstructed by:

- Loss of attachments
- Mucosal inflammation + fibrosis
- Mucus obstruction of lumen

Patients with COPD Exhibit Different Phenotypes

<table>
<thead>
<tr>
<th>Phenotype</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asthma COPD overlap syndrome</td>
<td>Mixed phenotype in COPD is defined as an airflow obstruction that is not completely reversible, accompanied by symptoms or signs of increased obstruction reversibility.</td>
</tr>
<tr>
<td>Emphysema-hyperinflation</td>
<td>Patients who present with dyspnea and intolerance to exercise as the predominating symptoms, which are frequently accompanied by signs of hyperinflation. Patients with emphysema phenotype present a tendency towards a lower BMI.</td>
</tr>
<tr>
<td>Frequent exacerbator</td>
<td>Patients reporting ≥2 exacerbations per year that are &gt;4 weeks apart. Patients may appear stable over time.</td>
</tr>
</tbody>
</table>

BMI, body mass index.


Exacerbation of COPD

An exacerbation of COPD is an acute event characterized by a worsening of the patient’s respiratory symptoms that is beyond normal day-to-day variations and leads to a change in medication.

Impact of COPD Exacerbations

- Exacerbations of COPD associated with:
  - Reduced lung function, health status, and physical activity
  - Increased risk of subsequent exacerbations and death
  - Development of complications
  - Worsening of comorbid conditions
- Frequent exacerbations associated with ↑ airway inflammation in the stable state
- Mortality from COPD exacerbations:
  - In-hospital for a hypercapnic exacerbation with acidosis is ~10%
  - All-cause mortality 3 years after hospitalization as high as 49%
  - Higher than mortality observed at 12 months following hospitalization for myocardial infarction

Risk Factors for COPD Exacerbations

- Continued exposure to:
  - Cigarette smoke
  - Industrial particulates
  - Indoor/outdoor pollution
- Worsening symptoms (dyspnea, cough, and secretions)
- Declining lung function
- Viral upper respiratory infections
- Previous exacerbation/hospitalization
- Increase in rescue medication use
- Maintenance medication nonadherence
- Poor device technique and inadequate medication administration
Prevention of Acute Exacerbations of COPD (AECOPD)

Patient with COPD

At risk for AECOPD

Nonpharmacologic therapies

Recommended
• Annual influenza vaccine
• Pulmonary rehab (AECOPD ≤ 4 weeks)
• Education and case management

Suggested
• Pneumococcal vaccine
• Smoking cessation
• COPD action plan

Not Suggested
• Education or case management alone
• Education with action plan but without case management
• Telemonitoring

Inhaled therapies

Recommended
• LABA vs placebo
• LAMA vs placebo, LABA, or SAMA
• ICS/LABA combination vs placebo, LABA, or ICS alone
• LABA (anticholinergic or ICS) or anticholinergic monotherapy

Suggested
• SAMA + SABA vs SABA
• SAMA + LABA vs LABA
• SAMA vs SABA
• LABA vs SAMA
• LAMA/ICS/LABA vs placebo

Oral therapies

Recommended
• Long-term macrolides
• PDE4 inhibitors
• Theophylline
• N-acetylcysteine
• Carbocysteine

Suggested
• Systemic corticosteroids in an attempt to decrease AECOPD >30 days after initial event
• Statins

Not Recommended
• Systemic corticosteroids; LABA, long-acting beta-agonist; LAMA, long-acting anticholinergic; PDE4, phosphodiesterase type 4 inhibitor; SABA, short-acting beta-agonist; SAMA, short-acting anticholinergic.


Impact of Comorbidities on Disease Progression and Future Exacerbations

- The majority of patients with COPD exhibit ≥3 comorbidities
- A subset of these have been associated with ↑ likelihood of disease progression and readmission for exacerbation
  - Congestive heart failure
  - Lung cancer
  - Anxiety
  - Depression
  - Skeletal muscle weakness
  - Osteoporosis

Case Study: 58-year-old Female

- History
  - Previous 35 pack-year history
  - Is currently participating in a smoking cessation program, but reports occasional lapses
  - Current diagnosis of GOLD group B
  - Referred to pulmonary rehabilitation

- Current medications
  - LAMA maintenance therapy
  - SABA prn

- Current presentation
  - Presents to ED with coughing and dyspnea lasting for ~2 hours despite repeated SABA treatments by inhaler
Assessment and Management of COPD Exacerbations

COPD Care Map: Initial Presentation to the ED

Point of Entry
ED (self-admitted or clinician referral)

Assess Severity of Acute Exacerbation

Implement/ Modify Therapy to Treat Acute Symptoms

Diagnostic Options
Arterial blood gases, pulse oximetry
Chest X-ray, ECG
Other

Therapeutic Options
Modifier bronchodilator therapy
Systemic steroids
Antibiotic therapy?
Consider NIV
Other

(Consider admission criteria)

ECG, electrocardiogram; NIV, non-invasive ventilation.

Slide courtesy of: Stanley B. Fiel, MD.
### Assessing Exacerbations

#### Medical History
- Severity of COPD based on degree of airflow limitation
- Duration of symptoms
- Number of previous episodes (total/hospitalizations)
- Comorbidities
- Present treatment regimen
- Previous use of mechanical ventilation

#### Signs of Severity
- Use of accessory muscles
- Paradoxical chest wall movements
- Oxygen desaturation
- Development of peripheral edema
- Hemodynamic instability
- Deteriorated mental status

---

### COPD Triage: Confirm Diagnosis of COPD Exacerbation Using These Criteria

<table>
<thead>
<tr>
<th>History</th>
<th>Physical Exam</th>
<th>Diagnostic Testing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diagnosis of COPD</td>
<td>Wheezing on lung exam</td>
<td>SpO₂ &lt;88% on room air</td>
</tr>
<tr>
<td>Cigarette smoking</td>
<td>Decreased breath sounds</td>
<td>Abnormal chest X-ray</td>
</tr>
<tr>
<td>Dyspnea on ordinary exertion, shortness of breath at rest</td>
<td>Use of accessory muscles</td>
<td>Hyperinflation on chest imaging</td>
</tr>
<tr>
<td>Cough, phlegm</td>
<td>Pursed-lip breathing</td>
<td></td>
</tr>
<tr>
<td>Hyperinflation</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

SpO₂, oxygen saturation.

Courtesy of Dr. Robert Wise, MD, Johns Hopkins Medicine, Johns Hopkins Bayview Medical Center
Management of Acute Exacerbations

- Assess severity of symptoms, chest radiograph, and blood gases and/or O₂ saturation
- Provide O₂ as indicated
- Bronchodilation
  - Increase doses/frequency of short-acting bronchodilators
  - Combine SABAs with anticholinergics
  - Use spacers or air-driven nebulizers
- Corticosteroids: oral preferred
- Consider antibiotics, oseltamivir phosphate, NIV, SC heparin, or low-molecular-weight heparin
- Identify and treat associated conditions

SC, subcutaneous.

Corticosteroids to Prevent Relapse of Exacerbations

Prednisone vs PBO: Probability of Remaining Relapse Free for 30 Days

Tick marks represent censored data. \( P = 0.04 \) by the log-rank test.

PBO, placebo.
Oral Corticosteroids are Preferred Route of Delivery for Patients with Exacerbations

- Study of patients who were referred for a COPD exacerbation warranting hospitalization (N=435)
  - N=107 patients received 60 mg prednisolone IV for 5 days
  - N=103 patients received 60 mg prednisolone orally for 5 days
- Therapies resulted in equivalent rates of:
  - Treatment failure within 90 days
  - Improvement in FEV₁ and QOL
  - Length of stay
- Oral route may be preferable in treatment of patients with COPD exacerbations due to convenience and cost

FEV₁, forced expiratory volume in 1 second; IV, intravenous; QOL, quality of life.

5-day Course of Corticosteroids Should be the Norm in Patients with COPD Exacerbations

- 2013 trial of 341 patients with COPD exacerbations
  - Patients had GOLD Stage 3-4 COPD
  - Average FEV₁ of 31% predicted
- Randomized to 5 or 14 days of prednisone (40 mg)
- No difference noted in time to exacerbation within 180 days (primary endpoint)
- Lung function, mortality, need for mechanical ventilation, and symptom scores were all similar between groups
- Adverse events rare and occurred equally in both groups
- Hospital stays averaged 1 day shorter with 5-day regimen

What is the Right Dose of Corticosteroids to Prevent Future Exacerbations?

- Considerations for systemic corticosteroid administration
  - Optimal formulation (eg, methylprednisolone or prednisone)
  - Dose
  - Route of administration (IV or oral)
  - Treatment duration
- Treatment of an AECOPD with higher doses of systemic corticosteroids does not improve patient outcomes
  - ICU treatment with >240 mg/day* methylprednisolone or equivalent was associated with worse outcomes and more frequent adverse events compared with lower doses

*Methylpredniolone, 125 mg every 6 hours, or 60 mg every 6 hours during the first 2 days of treatment. ICU, intensive care unit.


Association of Antibiotic Therapy and Outcomes of Patients with COPD Exacerbation

- Retrospective study of patients >40 years old hospitalized for a COPD exacerbation and treated with systemic corticosteroids (N=53,900)
- Addition of antibiotics was associated with:
  - 40% reduction in in-hospital mortality
  - 13% reduction in 30-day readmission for COPD

Goals of In-hospital Management of Patients with COPD

- Control exacerbation/restore patient function
- Assess risk for future exacerbations
- Address the patient’s current disease management
  - Medications
  - Lifestyle (particularly smoking status)
- Consider patient comorbidities
- Evaluate home care environment
- Implement discharge and transitional care plans designed to prevent readmission
- Ensure appropriate follow-up within 1 week

Diagnosis of COPD and Confirmatory Testing
Severity of COPD Symptoms: Classification Using Spirometry

<table>
<thead>
<tr>
<th>Category</th>
<th>Severity</th>
<th>Spirometry (% predicted)</th>
</tr>
</thead>
<tbody>
<tr>
<td>GOLD 1</td>
<td>Mild</td>
<td>FEV₁ ≥80%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>FEV₁/FVC &lt; 0.70</td>
</tr>
<tr>
<td>GOLD 2</td>
<td>Moderate</td>
<td>50% ≤ FEV₁ &lt; 80%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>FEV₁/FVC &lt; 0.70</td>
</tr>
<tr>
<td>GOLD 3</td>
<td>Severe</td>
<td>30% ≤ FEV₁ &lt; 50%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>FEV₁/FVC &lt; 0.70</td>
</tr>
<tr>
<td>GOLD 4</td>
<td>Very severe</td>
<td>FEV₁ &lt; 30%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>FEV₁/FVC &lt; 0.70</td>
</tr>
</tbody>
</table>

FVC, forced vital capacity.

Tools for Assessment of COPD Symptoms

- mMRC Dyspnea Scale
  - Assesses severity of patient breathlessness
  - 5 grades: 0 no breathlessness to 4 very severe
- COPD Assessment Test (CAT)
  - 8-question assessment that assigns a score of 1 to 5 to each question
  - Measures frequency of symptoms
  - Higher scores denote a more severe impact of COPD on a patient’s life

Both have been validated and relate well to other measures of health status and predict future mortality risk.

COPD Assessment Test is a trademark of the GlaxoSmithKline group of companies.
© 2009 GlaxoSmithKline group of companies. All rights reserved. Last updated: February 24, 2012.
### mMRC Questionnaire

**PLEASE TICK THE BOX THAT APPLIES TO YOU**  
**ONE BOX ONLY**

<table>
<thead>
<tr>
<th>mMRC Grade</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>I only get breathless with strenuous exercise.</td>
</tr>
<tr>
<td>1</td>
<td>I get short of breath when hurrying on the level or walking up a slight hill.</td>
</tr>
<tr>
<td>2</td>
<td>I walk slower than people of the same age on the level because of breathlessness, or I have to stop for breath when walking on my own pace on the level.</td>
</tr>
<tr>
<td>3</td>
<td>I stop for breath after walking about 100 meters or after a few minutes on the level.</td>
</tr>
<tr>
<td>4</td>
<td>I am too breathless to leave the house or I am breathless when dressing or undressing.</td>
</tr>
</tbody>
</table>

**Global Initiative for Chronic Obstructive Lung Disease. Global strategy for the diagnosis, management and prevention of chronic obstructive pulmonary disease. 2014 update. Available at:**


### CAT Questionnaire

**Example:** I am very happy  
00000  
I am sad  
00000

<table>
<thead>
<tr>
<th>Description</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>I never cough</td>
<td>3</td>
</tr>
<tr>
<td>I have no phlegm (mucus) in my chest at all</td>
<td>2</td>
</tr>
<tr>
<td>My chest does not feel tight at all</td>
<td>3</td>
</tr>
<tr>
<td>When I walk up a hill or one flight of stairs, I am not breathless</td>
<td>4</td>
</tr>
<tr>
<td>I am not limited doing any activities at home</td>
<td>2</td>
</tr>
<tr>
<td>I am confident leaving my home despite my lung condition</td>
<td>2</td>
</tr>
<tr>
<td>I sleep soundly</td>
<td>3</td>
</tr>
<tr>
<td>I have lots of energy</td>
<td>2</td>
</tr>
</tbody>
</table>

**Score: 21**

Risk in COPD

<table>
<thead>
<tr>
<th>Category</th>
<th>Exacerbations Per Year</th>
<th>Hospitalizations Per Year</th>
<th>3-year Mortality</th>
</tr>
</thead>
<tbody>
<tr>
<td>GOLD 1</td>
<td>?</td>
<td>?</td>
<td>?</td>
</tr>
<tr>
<td>GOLD 2</td>
<td>0.7 - 0.9</td>
<td>0.11 - 0.2</td>
<td>11%</td>
</tr>
<tr>
<td>GOLD 3</td>
<td>1.1 - 1.3</td>
<td>0.25 - 0.3</td>
<td>15%</td>
</tr>
<tr>
<td>GOLD 4</td>
<td>1.2 - 2.0</td>
<td>0.4 - 0.54</td>
<td>24%</td>
</tr>
</tbody>
</table>


Combined Assessment of COPD: 2014 Update vs Previous GOLD Guidelines

Risk

<table>
<thead>
<tr>
<th>Risk</th>
<th>Exacerbation History</th>
<th>Symptoms (mMRC or CAT score)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>&lt;30%</td>
<td>mMRC 0-1 (or) CAT &lt;10</td>
</tr>
<tr>
<td>3</td>
<td>30%-50%</td>
<td>mMRC ≥2 (or) CAT ≥10</td>
</tr>
<tr>
<td>2</td>
<td>50%-80%</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>≥80%</td>
<td></td>
</tr>
</tbody>
</table>

Case Study: 58-year-old Female
Exam and Test Results

- **Symptoms**
  - Cough productive with white sputum
  - Audible wheezing during the past 2 to 3 nights (according to husband)
  - Mild chest tightness
  - Dyspnea

- **Physical exam**
  - Wheezing and decreased breath sounds on lung exam
  - Temperature: 98.9°F oral
  - HR: 68
  - BP: 128/72

- **SpO₂**: 86% on room air
- Poor response to initial dose of short-acting bronchodilators

BP, blood pressure; HR, heart rate.

Treatment of COPD
### GOLD Recommendations for Initial Pharmacotherapy

<table>
<thead>
<tr>
<th>Patient Group</th>
<th>Recommended First Choice</th>
<th>Alternative Choice</th>
<th>Other Possible Treatments</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>SAMA prn or SABA prn</td>
<td>LABA or LAMA or SABA + SAMA</td>
<td>Theophylline</td>
</tr>
<tr>
<td>B</td>
<td>LAMA or LABA</td>
<td>LAMA + LABA</td>
<td>SABA and/or SAMA Theophylline</td>
</tr>
<tr>
<td>C</td>
<td>ICS + LABA or LAMA</td>
<td>LAMA + LABA or LAMA + PDE4 or LABA + PDE4</td>
<td>SABA and/or SAMA Theophylline</td>
</tr>
<tr>
<td>D</td>
<td>ICS + LABA and/or LAMA</td>
<td>ICS + LABA + LAMA or ICS + LABA + PDE4 or LABA + PDE4</td>
<td>Carbocysteine SABA and/or SAMA Theophylline</td>
</tr>
</tbody>
</table>


### Available Long-acting Bronchodilator Monotherapies

<table>
<thead>
<tr>
<th>Agent</th>
<th>Type</th>
<th>Delivery</th>
<th>Manufacturer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arformoterol</td>
<td>LABA</td>
<td>Nebulizer</td>
<td>Sunovion</td>
</tr>
<tr>
<td>Formoterol</td>
<td>LABA</td>
<td>Nebulizer</td>
<td>Mylan</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dry powder inhaler (DPI)</td>
<td>Merck</td>
</tr>
<tr>
<td>Indacaterol</td>
<td>LABA</td>
<td>DPI</td>
<td>Novartis</td>
</tr>
<tr>
<td>Salmeterol</td>
<td>LABA</td>
<td>DPI</td>
<td>GlaxoSmithKline</td>
</tr>
<tr>
<td>Aclidinium</td>
<td>LAMA</td>
<td>DPI</td>
<td>Forest</td>
</tr>
<tr>
<td>Tiotropium</td>
<td>LAMA</td>
<td>DPI</td>
<td>Pfizer/Boehringer Ingelheim</td>
</tr>
<tr>
<td>Olodaterol</td>
<td>LABA</td>
<td>Soft mist inhaler (SMI)</td>
<td>Boehringer Ingelheim</td>
</tr>
</tbody>
</table>
### Available Long-acting Bronchodilator Therapies in Combination with ICS

<table>
<thead>
<tr>
<th>Agent</th>
<th>Type</th>
<th>Delivery</th>
<th>Manufacturer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Formoterol + budesonide</td>
<td>LABA + ICS</td>
<td>Metered dose inhaler (MDI)</td>
<td>AstraZeneca</td>
</tr>
<tr>
<td>Salmeterol + fluticasone</td>
<td>LABA + ICS</td>
<td>DPI</td>
<td>GlaxoSmithKline</td>
</tr>
<tr>
<td>Vilanterol + fluticasone</td>
<td>LABA + ICS</td>
<td>DPI</td>
<td>GlaxoSmithKline</td>
</tr>
<tr>
<td>Formoterol + mometasone*</td>
<td>LABA + ICS</td>
<td>MDI</td>
<td>Merck</td>
</tr>
</tbody>
</table>

*Off-label use. Not indicated for the treatment of patients with COPD.

---

### PDE4 Inhibition

- May inhibit fibroblast-mediated contraction and formation of fibrotic tissues, which can disrupt lung function
- **Roflumilast**
  - Oral, selective, long-acting inhibitor of an enzyme called PDE4
  - Indicated for treatment to reduce the risk of exacerbations in patients with severe COPD associated with chronic bronchitis and a history of exacerbations

### Future of COPD Treatment

<table>
<thead>
<tr>
<th>Agent</th>
<th>Type</th>
<th>Delivery</th>
<th>Manufacturer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glycopyrronium bromide</td>
<td>LAMA</td>
<td>Nebulizer</td>
<td>Sunovion</td>
</tr>
<tr>
<td></td>
<td></td>
<td>DPI</td>
<td>Vectura, Sosei/Novartis</td>
</tr>
<tr>
<td></td>
<td></td>
<td>MDI</td>
<td>Pearl</td>
</tr>
<tr>
<td>Indacaterol + glycopyrronium bromide</td>
<td>LABA + LAMA</td>
<td>DPI</td>
<td>Vectura, Sosei/Novartis</td>
</tr>
<tr>
<td>Umeclidinium + vilanterol</td>
<td>LABA + LAMA</td>
<td>DPI</td>
<td>GSK/Theravance</td>
</tr>
<tr>
<td>Olodaterol + tiotropium</td>
<td>LABA + LAMA</td>
<td>SMI</td>
<td>Boehringer Ingelheim</td>
</tr>
<tr>
<td>Aclidinium + formoterol</td>
<td>LABA + LAMA</td>
<td>DPI</td>
<td>Almirall/Forest</td>
</tr>
</tbody>
</table>

### COPD Maintenance Treatment by Airflow Limitation/Risk

<table>
<thead>
<tr>
<th>FEV₁, % Predicted (Airflow Limitation)</th>
<th>Exacerbation Grade (Risk)</th>
<th>Treatment Considerations</th>
</tr>
</thead>
<tbody>
<tr>
<td>≥80%</td>
<td>A (Low)</td>
<td>Smoking cessation; vaccinations; SABA prn</td>
</tr>
<tr>
<td>50%-80%</td>
<td>B (Medium)</td>
<td>Add to above: nebulized LABA-LAMA daily; pulmonary rehab; exacerbation action plan</td>
</tr>
<tr>
<td>30%-50%</td>
<td>C (High)</td>
<td>Add to above: ICS for exacerbation prone; referral to pulmonologist</td>
</tr>
<tr>
<td>&lt;30%</td>
<td>D (Very high)</td>
<td>Add to above: long-term oxygen therapy; consider surgical options</td>
</tr>
</tbody>
</table>

Slide courtesy of Patrick J. Dunne.
The Reversible Obstructive Airway Disease (ROAD) Program

- RTs provide inpatient COPD education
  - Anatomy and physiology of the respiratory system
  - Proper inhalation device use with return demonstration
  - Controlled breathing techniques
  - Infection control
  - Referral services
  - Medication reconciliation
- Patients given a written individualized action plan incorporating GOLD guidelines
- Participation in the program was associated with reduced hospital length of stay and readmission for COPD exacerbations

RT, respiratory therapist.

COPD Care Map: Transition Management

Transition Management
- Patient Education/Counseling
  - Cultural competency
  - Health literacy
- Home Care
  - Update referral tracking and care information
  - Communicate with specific providers
  - Assess for barriers to care and refer to community/social services/other HCPs, if needed
  - Provide patient education/ counseling
  - Refer to pulmonary rehab, if applicable
- Pharmacy
  - Medication reconciliation
- Medication Management
  - Assess patient tolerability
  - Assess patient response to medications
  - Assess for nonadherence
  - Reconcile any new medications

Consider 72-hour postdischarge follow-up call

Collaborative Care Team: 1 to 2 Week postdischarge follow-up

- Reassess with spirometry if patient shows improvement
- Evaluate patient health literacy
- Consider including therapy known to reduce exacerbation risk (long-acting inhaled bronchodilators, with or without inhaled steroids, and possible PDE4 inhibitors)

Slide courtesy of: Stanley B. Fiel, MD.
Key Features of Effective Patient Education and Training

- Information about the nature of COPD
- Disease management strategies
  - Recognizing an exacerbation
  - Minimizing dyspnea
  - Reducing risk of exacerbations
    - Guidance on how to stop smoking
    - Pulmonary rehabilitation
    - Vaccinations
- Instruction on inhaler technique/use of nebulizer

Smoking Cessation

- Considered to be the most important therapeutic intervention in patients with COPD
- Has been shown to reduce COPD risk and mitigate the decline in pulmonary function
- Brief clinical interventions are clinically effective and cost effective
- Smoking cessation aids
  - Nicotine replacement gum, patch, inhaler
  - Bupropion
  - Varenicline


The 5 A’s of Smoking Cessation

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ask</td>
<td>About tobacco use with all patients (eg, have you used any form of tobacco in the past 6 months?) and assess readiness to quit. If time allows, assess the person’s level of motivation to change behavior, using motivational interviewing techniques. Document tobacco use status.</td>
</tr>
<tr>
<td>Advise</td>
<td>Every tobacco user of the importance of quitting in a nonjudgmental and unambiguous manner.</td>
</tr>
<tr>
<td>Assess</td>
<td>How ready the patient currently is to quit tobacco use.</td>
</tr>
<tr>
<td>Assist</td>
<td>By providing minimal intervention. Refer to support and self-help resources, community clinics and services, other HCPs.</td>
</tr>
<tr>
<td>Arrange</td>
<td>Follow-up or referral</td>
</tr>
</tbody>
</table>

Available at: http://mdquit.org/cessation-programs/brief-interventions-5.
Components of a Comprehensive Pulmonary Rehabilitation Program

- Smoking cessation
  - Most important therapeutic intervention
  - Health benefits are immediate and substantial
- Exercise training
  - Significant improvements of dyspnea, health-related QOL, mobility, and decreased loss of lung function
- Nutrition counseling
  - COPD-related malnutrition is frequently observed
  - May contribute to wasting of peripheral and respiratory muscles involved in breathing or immune impairment
- Education of the patient and family members about the disease


Health Outcomes Associated with Pulmonary Rehabilitation Programs

- Significantly improves exercise capacity and health status in patients who have had an acute exacerbation of COPD
- Reduces the number of readmissions in the year following initiation
- Although the minimum length for rehabilitation to be effective is 6 weeks, benefit to the patient increases the longer the program continues

**Vaccinations to Prevent Future COPD Exacerbations**

- **Influenza vaccines**
  - ↓ respiratory tract infections that result in hospitalization and death in patients with COPD

- **Pneumococcal vaccines**
  - ↓ rate of community-acquired pneumonia in COPD patients
  - Pneumococcal infections result in a significant percentage of acute exacerbations of COPD

- **Vaccinations remain highly underused**
  - 38.4% of patients with COPD admitted to a university medical center had a prior influenza vaccine
  - Only half of eligible patients presenting with an exacerbation to a set of urban hospitals had influenza and pneumococcal vaccines

Misuse of handheld devices for COPD management has been shown to be as high as which of the following in hospitalized patients with COPD?

A. 55%
B. 65%
C. 75%
D. 85%

Misuse of Devices for COPD in Hospitalized Patients Is Common

- COPD patient population is diverse with various levels of functioning
- Handheld devices assume patient is able to use correctly

Mishandling of Inhaler Devices by Elderly in a Primary Care Setting

Frequency of Critical Errors by Device According to Age Class

<table>
<thead>
<tr>
<th>Device</th>
<th>Below 30 years</th>
<th>From 31 to 64 years</th>
<th>65 years and Over</th>
</tr>
</thead>
<tbody>
<tr>
<td>Formoterol DPI</td>
<td>15%</td>
<td>20%</td>
<td>30%</td>
</tr>
<tr>
<td>Pirbuterol CFC</td>
<td>10%</td>
<td>15%</td>
<td>25%</td>
</tr>
<tr>
<td>FP/salmeterol DPI</td>
<td>5%</td>
<td>10%</td>
<td>15%</td>
</tr>
<tr>
<td>Albuterol MDI</td>
<td>30%</td>
<td>35%</td>
<td>30%</td>
</tr>
<tr>
<td>Budesonide/formoterol DPI</td>
<td>20%</td>
<td>25%</td>
<td>30%</td>
</tr>
</tbody>
</table>

CFC, chlorofluorocarbon.

*No longer available.


Satisfaction With Nebulized Therapy

- Overall, patients with mild-to-moderate COPD were/had:\n  - “Highly satisfied with their current nebulized treatment” (89%)
  - “Easier breathing” (68%)

- Patients agreed that nebulization provided:\n  - “Better control of symptoms” (85%)
  - “Greater confidence that the right amount of medication was being delivered” (84%)

- Caregivers of patients with COPD reported nebulization:\n  - “Made it easier to care for their friend/family member” (86%)

Discharge Planning

- The use of maintenance bronchodilator therapy for COPD is low
  - At discharge from exacerbation:
    - 45% of patients with COPD were prescribed maintenance bronchodilators
    - 23% of patients with COPD were not prescribed an inhaled therapy at all
  - The use of long-acting maintenance bronchodilators are recommended for all patients with GOLD group B and above

Criteria for Patient Discharge

- Inhaled SABA is required no more than every 4 hours
- Able to:
  - Use long-acting bronchodilators
  - Walk across room
  - Eat and sleep without frequent awakening by dyspnea
- Clinically stable for 12 to 24 hours
- Patient understands correct use of all medications
- Follow-up and home care arrangements completed
- Confident that the patient can manage successfully at home

Key Considerations for Discharge and Follow-up

<table>
<thead>
<tr>
<th>Discharge</th>
<th>Follow-up</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Assurance of effective maintenance treatment</td>
<td>• Ability to cope in usual environment</td>
</tr>
<tr>
<td>• Consider device selection</td>
<td>• Lung function (FEV₁, FVC)</td>
</tr>
<tr>
<td>• Reassess inhaler technique</td>
<td>• Inhaler technique and adherence</td>
</tr>
<tr>
<td>• Provide patient education</td>
<td>• Need for long-term oxygen therapy and/or home nebulizer</td>
</tr>
<tr>
<td>• Assess need for long-term oxygen therapy</td>
<td>• Physical activity CAT or mMRC</td>
</tr>
<tr>
<td>• Assure follow-up visit in 4 to 6 weeks</td>
<td>• Status of comorbidities</td>
</tr>
<tr>
<td>• Provide a plan for comorbidities</td>
<td></td>
</tr>
</tbody>
</table>
Summary

- COPD represents a significant health and economic burden due to its high prevalence, chronicity, comorbidities, complexities, and progressive nature.
- Appropriate treatment requires accurate diagnosis using objective measures to assess disease severity and risk for future exacerbations.
- Individual characteristics influence the ability to adhere to therapy once patients leave the hospital and should be taken into account as part of discharge planning.
- A multidisciplinary team of HCPs can provide patients with the education and training required to achieve optimal control of their disease and avoid unnecessary hospital readmissions.

Additional Resources

- COPD Foundation
  - www.copdfoundation.org
- Global Initiative for Chronic Obstructive Lung Diseases
  - www.goldcopd.org
- Society of Hospital Medicine (SHM) Project Boost
  - www.hospitalmedicine.org/boost
- Smoking Cessation
  - www.smokefree.gov
  - www.lung.org/stopsmoking