Acute Exacerbations of COPD: Practical Strategies to Improve Outcomes and Reduce Readmission

Agenda

5:30–5:35 AM  Welcome and Introduction
   Chair: Sandra G. Adams, MD, FCCP

5:35–5:50 AM  Review of Patient Case Presentation / Collection of Benchmark Outcomes Data
   Sandra G. Adams, MD, FCCP

5:50–6:10 AM  Which Patients are at Higher Risk for Complications of COPD and AECOPD?
   Sandra G. Adams, MD, FCCP

6:10–6:30 AM  Practical Strategies to Prevent AECOPD
   Sidney S. Braman, MD, FCCP

6:30–6:50 AM  What Can we do to Reduce Readmission for AECOPD?
   Brian Carlin, MD, FCCP

6:50–7:00 AM  Re-Review of Patient Case Presentation / Collection of Post-Education Outcomes Data
   Sandra G. Adams, MD, FCCP
Learning Objectives

- Identify three risk factors that are associated with increased risk of complications of COPD
- Recognize four pharmacologic and nonpharmacologic strategies to successfully prevent acute exacerbation of COPD
- Identify two strategies to reduce readmission rates for patients hospitalized with an acute exacerbation of COPD

Acute Exacerbations of COPD: Practical Strategies to Improve Outcomes and Reduce Readmission

Case

Sandra G. Adams, MD, MS, FCCP
Professor of Medicine
Pulmonary Diseases / Critical Care Medicine
University of Texas Health Science Center at San Antonio
South Texas Veterans Healthcare System
San Antonio, Texas
Mrs. P

• 57-year-old woman with ischemic heart disease (prior stent placement), gastroesophageal reflux disease, hypertension, and severe COPD (FEV₁ = 45% of predicted)
• At baseline, she has a cough productive of white sputum and dyspnea on exertion at 30 meters
• Medications: cardioselective beta-blocker, short-acting beta₂ agonist, long-acting muscarinic antagonist, and a long-acting beta₂ agonist/inhaled corticosteroid combination agent

Mrs. P

• Admitted with increased dyspnea (now at rest) and increased sputum production (now yellow)
• Denies chest pain or pressure
• Treated for an acute exacerbation of COPD with nebulized short-acting bronchodilators, systemic corticosteroids, and an oral antibiotic
• She improved and was discharged on hospital day #4
Mrs. P

- Over the next 2 weeks, she has “good days and bad days”
- 16 days after discharge, she returned to the emergency department complaining of progressively worsening shortness of breath and increased cough, now productive of green sputum
- She required readmission to the hospital for further therapy and care

Which of the following interventions would have been the most likely to have reduced her risk of readmission?

A. Discontinue the systemic cardioselective beta-blocker
B. Ensure medication adherence with proper inhaler technique
C. Administer a 10-day course of an intravenous antibiotic
D. Provide an incentive spirometer to use 4-6 times/day
Acute Exacerbations of COPD:
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Which Patients Are at 
Highest Risk for 
Complications of 
COPD and AECOPD?

Educational Support

Sponsored by the American College of Chest Physicians.

This educational activity is supported by an educational 
grant from Boehringer Ingelheim.

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Sandra G. Adams, MD, MS, FCCP
Grant monies (from sources other than industry): Veterans Administration,
National Institute of Health, Chest Foundation, University of Texas Patient Safety Grant
Grant monies (from industry related sources): Bayer Pharmaceutical, Schering-Plough, Boehringer Ingelheim, GlaxoSmithKline, Pfizer, Novartis, Centocor
Shareholder: President of not-for-profit organization entitled WipeDisease Foundation
Learning Objective

• Identify at least three factors that are associated with increased risk of complications of COPD

COPD Patients With a Greater Frequency of Severe Exacerbations* Have a Higher Risk of All-Cause Mortality


*Severe exacerbations = exacerbation required emergency visits or hospital admissions.
Health Economic Burden Increases With Severity of Exacerbations

Mean Cost per Exacerbation (2007 USD)

- Mittmann (2008) (Canada)
- Oostenbrink (2004) (Belgium/Netherlands)
- Andersson (2002) (Sweden)
- Price (1999) (United Kingdom)

$0,000 - $10,000

Mild  Moderate  Severe

Which characteristic is associated with the highest risk of a patient having an acute exacerbation of COPD within the next year?

A. Baseline blood leukocyte cell count of $5.5 \times 10^9$/L
B. Active history of smoking 1.5 packs/day for 20 years
C. Prior admission for exacerbation about 7 months ago
D. Current plasma C-reactive protein level of 2.5 mg/L
Probability of COPD Hospitalization within 6 Months

Factors used for calculation of COPD hospitalization risk:
- Older age
- FEV₁ percentage of predicted
- Oral steroids at entry
- Cardiovascular comorbidity
- Unscheduled visits in prior year
- Hospital admission in prior year


Risk Factors for Exacerbations in ECLIPSE

N = 2138

<table>
<thead>
<tr>
<th>Factor</th>
<th>AECOPD: ≥ 2 vs 0</th>
<th>AECOPD: 1 vs 0</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Odds Ratio (95% CI)</td>
<td>P Value</td>
</tr>
<tr>
<td>Exacerbation in previous year (any vs. none)</td>
<td>5.72 (4.47-7.31)</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>FEV₁ per 100-ml decrease</td>
<td>1.11 (1.08-1.14)</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>SGRQ per 4-point increase</td>
<td>1.07 (1.04-1.10)</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>History of reflux or heartburn (yes vs no)</td>
<td>2.07 (1.58-2.72)</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>White-cell count, per 1x10¹³/mm³ increase</td>
<td>1.08 (1.03-1.14)</td>
<td>0.002</td>
</tr>
</tbody>
</table>

ECLIPSE = Evaluation of COPD Longitudinally to Identify Predictive Surrogate Endpoints

**Absolute 5-Year Risk of Frequent Exacerbations**

C-reactive Protein, Fibrinogen, and Blood Leukocyte Count

Prospective cohort N = 61,650: Copenhagen studies 2001-2008 COPD N = 6574 (by fixed ratio), N = 3083 exacerbations; Not included: chronic bronchitis and gastroesophageal reflux and 22% were never smokers

Plasma CRP, fibrinogen, and blood leukocyte count high/low cut points: 3 mg/L, 14 µmol/L, and 9 \times 10^9/L


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**Risks of AECOPD During Maximum Follow-up**

Adjusted for age, sex, FEV1 predicted, smoking, inhaled medication, BMI, history of frequent exacerbations and time since most recent prior exacerbation

Chronic Bronchitis
Distinct Health Care Issue

Exacerbation requiring hospitalization within the past year
- Without chronic bronchitis: 1.7%
- With chronic bronchitis: 4.2%
  *P < 0.05

Exacerbation requiring a visit to a doctor within the past year
- Without chronic bronchitis: 5.3%
- With chronic bronchitis: 12.5%
  **P < 0.01

Any exacerbation within the past year
- Without chronic bronchitis: 6.6%
- With chronic bronchitis: 16.7%
  **P < 0.01


Cough and Sputum Production Indicate Higher Rate of Severe Exacerbation by History (COPDGene)

Total Exacerbation Rate
- Without chronic bronchitis: 1.3
- With chronic bronchitis: 1.4
  P < 0.0001

History of Severe Exacerbations
- Without chronic bronchitis: 14
- With chronic bronchitis: 25
  P = 0.0238

Which of the following places a patient with COPD at highest risk of having an acute exacerbation within the next year?

A. Body mass index of 30 m/kg²
B. Bronchial wall thickness of 1.5 mm
C. FEV₁ of 1.5 liters (60% of predicted)
D. Pulmonary artery to aorta ratio of 1.5

Risk Factor for Admission for COPD Exacerbation: Low Body Mass Index (BMI)

### Pulmonary Artery to Aorta Ratio in the ECLIPSE Validation Cohort (Multivariable Analysis)

<table>
<thead>
<tr>
<th>All Exacerbations (Data from Year 3)</th>
<th>Odds Ratio (95% CI)</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exacerbation in previous year</td>
<td>3.59 (2.76-4.67)</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>FEV₁ per percentage-point decrease</td>
<td>1.01 (1.01-1.02)</td>
<td>0.001</td>
</tr>
<tr>
<td>SGRQ, per 1-point increase</td>
<td>1.00 (0.99-1.01)</td>
<td>0.17</td>
</tr>
<tr>
<td>Gastroesophageal reflux disease</td>
<td>1.69 (1.27-2.23)</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>White-cell count, per 1x10^3/mm³ increase</td>
<td>1.01 (0.96-1.06)</td>
<td>0.85</td>
</tr>
<tr>
<td>Pulmonary artery to aorta ratio (PA:A) &gt; 1</td>
<td>6.68 (4.47-9.96)</td>
<td>&lt; 0.001</td>
</tr>
</tbody>
</table>

ECLIPSE = Evaluation of COPD Longitudinally to Identify Predictive Surrogate Endpoints; FEV₁ = forced expiratory volume in one second; CI = confidence interval; SGRQ = Saint George’s Respiratory Questionnaire


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### Pulmonary Artery to Aorta Ratio (PA:A) > 1

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<tr>
<th>All Exacerbations (Data from Year 3)</th>
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CI = confidence interval, A = Aorta, PA = Pulmonary Artery

Risk Factors for Exacerbations
ECLIPSE: 3-Year Study

- Hospitalized for Exacerbation in Year 1 (considered “severe”)
- Frequent Exacerbations (≥ 2 during the year)

ECLIPSE = Evaluation of COPD Longitudinally to Identify Predictive Surrogate Endpoints
GOLD = Global Initiative for Chronic Obstructive Lung Disease

Radiologic Phenotypes: COPDGene (N = 1002)

- Emphysema-predominant (≥ 35% emphysema)
- Airway-predominant (≥ 1.75mm bronchial wall thickness)

Summary: Risk Factors for COPD Exacerbations

- Past exacerbation and/or admission for exacerbation
- Severe obstruction to airflow ($\text{FEV}_1 < 50\%$ of predicted)
- Low body mass index ($< 20 \text{ kg/m}^2$)
- Pulmonary artery to aorta ratio (PA:A) $> 1$
- Elevated C-reactive protein, fibrinogen, and WBC count
- Long-term supplemental oxygen therapy
- Chronic oral corticosteroids
- Cardiovascular comorbidity
- Chronic sputum production/chronic bronchitis
- Gastroesophageal reflux disease (GERD)
- Older age

Abbreviations

BMI: Body Mass Index
COPD: Chronic Obstructive Pulmonary Disease
CRP: C-reactive Protein
FEV$_1$: Forced expiratory volume in 1 second
GERD: Gastroesophageal reflux disease
GOLD: Global Initiative for Chronic Obstructive Lung Disease
SGRQ: St George's Respiratory Questionnaire
Which characteristic is associated with the highest risk of a patient having an acute exacerbation of COPD within the next year?

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D. Current plasma C-reactive protein level of 2.5 mg/L

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C. FEV₁ of 1.5 liters (60% of predicted)
D. Pulmonary artery to aorta ratio of 1.5
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Practical Strategies to Prevent Acute Exacerbations of COPD

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Speaker

Sidney S. Braman, MD, FCCP
The Icahn School of Medicine at Mount Sinai
New York, New York

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Sidney S. Braman, MD, FCCP
Consultant fee, speaker bureau, advisory committee, etc: Forest, Boehringer Ingelheim, Genentech, Sunovion
Learning Objective

• Recognize four pharmacologic and nonpharmacologic strategies to successfully prevent acute exacerbation of COPD

Specific Objectives

• Provide current definition of acute exacerbations of COPD (AECOPD)

• Review causes and mechanisms of AECOPD

• Describe evidence-based measures to prevent AECOPD
What Is an AECOPD?

• The current definition of an acute exacerbation of COPD (AECOPD) in the GOLD Guidelines is as follows:
  – “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.”

![Day-to-Day Variability Diagram](http://www.goldcopd.org/guidelines-global-strategy-for-diagnosis-management.html. Accessed August 2013.)

Potential Causes of Exacerbations

• Bacterial or viral infection
• Pollutants:
  – Nitrogen dioxide
  – Particulates (PM$_{10}$)
  – Sulfur dioxide
  – Ozone
• Cold weather
• Interruption of regular treatment
Etiology of AECOPD

Causes of exacerbations requiring hospitalization in patients (N = 64)

- None Detected: 21.8%
- Bacteria: 29.7%
- Virus: 23.4%
- Bacteria and Virus: 25.0%


CRP Elevations During Exacerbations in Patients With Mucoid and Purulent Sputum

Bronchial Neutrophils Are Increased During Exacerbations

* $P < 0.01$ versus stable disease

[Bar chart showing higher median neutrophils in exacerbations compared to stable disease.]


Bronchial Eosinophils Are Increased During Exacerbations

* $P < 0.001$ versus stable disease

[Bar chart showing higher EG-2+ cells in bronchial biopsies during exacerbations. EG-2-positive = positive for binding of monoclonal antibody directed against eosinophil cationic protein.]

**Most Rehospitalizations after AECOPD Are Not For COPD**

<table>
<thead>
<tr>
<th>Condition at Index Discharge</th>
<th>30-Day Rehospitalization Rate (%)</th>
<th>Reasons for Rehospitalization (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Most Frequent</td>
<td>2nd Most Frequent</td>
</tr>
<tr>
<td>All</td>
<td>21.0</td>
<td>Heart failure (8.6)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heart failure</td>
<td>26.9</td>
<td>Heart failure (17.0)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pneumonia</td>
<td>20.1</td>
<td>Pneumonia (29.1)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>COPD</td>
<td>22.6</td>
<td>COPD (36.2)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Psychoses</td>
<td>24.8</td>
<td>Pneumonia (67.3)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GI problems</td>
<td>19.2</td>
<td>GI problems (21.1)</td>
</tr>
</tbody>
</table>

COPD = chronic obstructive pulmonary disease; GI = gastrointestinal; MI = myocardial infarction


**Impact of Exacerbations in COPD**

- **Patients With Frequent Exacerbations**
  - Faster Decline in Lung Function
  - Greater Airway Inflammation
  - Poorer Quality of Life
  - Higher Mortality

Which of the following approaches has NOT been shown to reduce COPD exacerbation rates?

A. Inhaled corticosteroids  
B. Phosphodiesterase-4 inhibitors  
C. Oral corticosteroids  
D. Influenza vaccination  
E. Patient education programs

Improved adherence to medications for COPD is associated with:

A. Lower cost to the patient  
B. Decreased mortality for COPD  
C. Higher hospitalization rates because of complications  
D. Will have no effect on exacerbations or hospitalization rates
Nonpharmacologic Evidence-Based Measures That Reduce COPD Exacerbations

- Assess adherence
- Smoking cessation
- Immunizations
- Pulmonary rehabilitation
- Patient education


Widespread Nonadherence to COPD Medications

Persistence With Inhaled Medications Declines to About 50% Within 6 Months of Initiation


Persistence with any inhaler was 36%, 23%, and 17% at years 1, 2, and 3

Higher Adherence to Therapy Lowers Risk for Hospitalization in COPD

Higher Adherence to Therapy Is Associated with Decreased Risk for Severe COPD Exacerbations

- Good adherence was associated with a 44% reduction in risk for severe exacerbations requiring hospitalization.


Probability of Death (%)

Time to Death (weeks)

Good adherence was associated with a 60% mortality risk reduction independent of therapy.

Patient-related Factors: Belief in Treatment Efficacy Is Associated With Higher Adherence


Long-term Effects of Pulmonary Rehabilitation

Pulmonary Rehabilitation Following COPD Exacerbations: Hospitalization

<table>
<thead>
<tr>
<th>Study or Subgroup</th>
<th>Experimental Events</th>
<th>Control Events</th>
<th>Weight</th>
<th>Odds Ratio M-H, Random, 95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Behnke 2000</td>
<td>3</td>
<td>14</td>
<td>9</td>
<td>12, 16.7%</td>
</tr>
<tr>
<td>Eaton 2009</td>
<td>11</td>
<td>47</td>
<td>15</td>
<td>50, 29.9%</td>
</tr>
<tr>
<td>Man 2004</td>
<td>2</td>
<td>20</td>
<td>12</td>
<td>21, 18.1%</td>
</tr>
<tr>
<td>Murphy 2005</td>
<td>2</td>
<td>13</td>
<td>5</td>
<td>13, 16.2%</td>
</tr>
<tr>
<td>Seymour 2010</td>
<td>2</td>
<td>30</td>
<td>10</td>
<td>30, 19.0%</td>
</tr>
<tr>
<td><strong>Total (95% CI)</strong></td>
<td>124</td>
<td>126</td>
<td>100.0%</td>
<td>0.22, 0.58</td>
</tr>
</tbody>
</table>

Total events: 20 | 51

Heterogeneity: Tau^2 = 0.61; Chi^2 = 8.15, df = 4 (P = 0.09); I^2 = 51%
Test for overall effect: Z = 3.06 (P = 0.002)


Influenza Vaccination: Risk for Any Exacerbation

- Evaluation of results from randomized clinical trials indicates that inactivated influenza vaccine reduces exacerbations in COPD patients
- The magnitude of this benefit is similar to that seen in large observational studies, and was due to a reduction in exacerbations occurring three or more weeks after vaccination, and due to influenza
- There is a mild increase in transient local adverse effects with vaccination, but no evidence of an increase in early exacerbations

Pneumococcal Vaccination for COPD

< 65 Years

Cumulative Proportion of Patients Without Pneumonia

Log rank = 6.68

\[ P = 0.0097 \]

Time (days)

Vaccinated = 91
Control = 116

Log rank = 3.85

\[ P = 0.0498 \text{ (NS)} \]

Time (days)

Vaccinated = 132
Control = 114


Patient Education in COPD Reduces Exacerbations

Hospital Admissions for Exacerbations
Hospital Admissions for Other Reasons
Emergency Department Visits for Exacerbations
Unscheduled Physician Visits

Intervention versus Control (%)

-39.8
-57.1
-41
-58.9

Pharmacologic Evidence-Based Measures That Reduce AECOPD

- Bronchodilators
- Inhaled corticosteroids
- PDE-4 inhibitors
- Prophylactic antibiotics


Effects of Long-acting Bronchodilators on Exacerbations

TORCH: Effects of Treatment on Exacerbations – Relation With Baseline FEV$_1$

<table>
<thead>
<tr>
<th>% FEV$_1$ at Baseline</th>
<th>Placebo</th>
<th>SAL</th>
<th>FP</th>
<th>SFC</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 30%</td>
<td>1.79</td>
<td>1.40</td>
<td>1.23</td>
<td>1.54</td>
</tr>
<tr>
<td>30–&lt; 50%</td>
<td>1.24</td>
<td>1.08</td>
<td>0.99</td>
<td>0.91</td>
</tr>
<tr>
<td>≥ 50%</td>
<td>0.82</td>
<td>0.71</td>
<td>0.68</td>
<td>0.57</td>
</tr>
</tbody>
</table>


PDE4 Inhibitors Target Multiple Mechanisms

Effects of Roflumilast on the Rate of Moderate/Severe Exacerbations

Co-primary endpoint: Exacerbation rate

![Graph showing Mean Rate of Exacerbations per Patient-Year for Placebo and Roflumilast.]

-16.9% (CI: -25; -8)
P < 0.0003


Roflumilast Significantly Reduced Exacerbations When Added to LABA

Pre-specified analysis of exacerbation rate in LABA subgroup

![Graph showing Mean rate exacerbations (moderate or severe) per patient-year for LABA + placebo and LABA + roflumilast.]

-21% (CI: -31; -9)
P = 0.0011

Macrolides Prevent Exacerbations

<table>
<thead>
<tr>
<th></th>
<th>Median Time to Exacerbation (days)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Erythromycin¹</td>
<td>271</td>
</tr>
<tr>
<td>Azithromycin²</td>
<td>266</td>
</tr>
<tr>
<td>Macrolide</td>
<td>89</td>
</tr>
<tr>
<td>Placebo</td>
<td>174</td>
</tr>
<tr>
<td>P-value</td>
<td>0.020</td>
</tr>
</tbody>
</table>


Summary

- COPD exacerbations may have a profound effect on patient outcomes; effective measures to reduce their frequency are available
- Viral, bacterial, and environmental conditions have been found to be causative agents
- Both pharmacologic and nonpharmacologic approaches can reduce COPD exacerbation rates
- Patient adherence to therapy needs to be assessed at each visit as nonadherence is common in COPD patients
Abbreviations

CHF: Congestive heart failure
COPD: Chronic Obstructive Pulmonary Disease
CRDQ: Chronic Respiratory Disease Questionnaire
CRP: Serum C-reactive protein
EG-2: Monoclonal antibody to eosinophil cationic protein
FDC: Fixed-dose combination
FEV1: Forced expiratory volume in 1 second
FP: Fluticasone propionate
ICS: Inhaled corticosteroid
LABA: Long-acting beta agonist
LAMA: Long-acting muscarinic antagonist
PDE: Phosphodiesterase
SAL: Salmeterol
SFC: Salmeterol and fluticasone propionate
SGRQ: St George’s Respiratory Questionnaire

Which of the following approaches has NOT been shown to reduce COPD exacerbation rates?

A. Inhaled corticosteroids
B. Phosphodiesterase-4 inhibitors
C. Oral corticosteroids
D. Influenza vaccination
E. Patient education programs
Improved adherence to medications for COPD is associated with:

A. Lower cost to the patient
B. Decreased mortality for COPD
C. Higher hospitalization rates because of complications
D. Will have no effect on exacerbations or hospitalization rates

Thank You For Your Attention!
Acute Exacerbations of COPD: Practical Strategies to Improve Outcomes and Reduce Readmissions

What Can We Do to Reduce Readmissions for AECOPD?

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Brian W. Carlin, MD, FCCP
Fiduciary position (of any organization, association, society, etc, other than ACCP):
National Board of Respiratory Care (executive committee, board of trustees),
National Lung Health Education Program (executive committee, board of trustees, chairperson); US COPD Coalition (board)
Consultant fee, speaker bureau, advisory committee, etc: GlaxoSmithKline, Boehringer Ingelheim, Respironics, Forest, Breathe Technologies
Learning Objective

• Identify two strategies to reduce readmission rates for patients hospitalized with an acute exacerbation of COPD

Specific Learning Objectives

• List two types of transition of care programs for patients following hospitalization for a COPD exacerbation

• Develop a transition of care program for patients following hospital discharge
The thirty day readmission rate for patients discharged following admission for a COPD exacerbation approaches:

A. 5%
B. 12%
C. 24%
D. 36%

A 55-year-old man with COPD and CHF is discharged from the hospital following a four-day admission for an exacerbation of COPD. He is fully ambulatory and states he is back to 80% of his baseline condition. He is discharged on a long-acting beta agonist/inhaled corticosteroid, a long acting muscarinic agent, a tapering course of prednisone, and supplemental oxygen therapy. Which of the following would provide him the most benefit as part of the discharge planning process?

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![Bar chart showing percentages for options A, B, C, and D: 12%, 4%, 8%, 76%]
Pennsylvania Health Care Cost Containment Council (PHC4) 2011


Pennsylvania Health Care Cost Containment Council (PHC4) 2011

Pennsylvania Health Care Cost Containment Council (PHC4) 2011

Chronic Obstructive Pulmonary Disease (COPD)

Chronic Obstructive Pulmonary Disease (COPD)
Chronic damage, inflammation, and narrowing of the airways in the lungs. Common COPD diseases include emphysema and chronic obstructive bronchitis.

Understanding the Symbols
The symbols displayed

<table>
<thead>
<tr>
<th>Hospital</th>
<th>Cases</th>
<th>Mortality</th>
<th>Readmission (for any reason)</th>
<th>Average Hospital Charge</th>
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</thead>
<tbody>
<tr>
<td>TOTAL: Statewide</td>
<td>34,303</td>
<td>0.8%</td>
<td>22.1%</td>
<td>$25,431</td>
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<td>Western Pennsylvania</td>
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<td>0.7%</td>
<td>21.4%</td>
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<td>☐</td>
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<td>Allegheny General</td>
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<td>Canonsburg General</td>
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<td>☐</td>
<td>☐</td>
<td>$14,454</td>
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</table>


Readmission Reduction Programs

The Evidence
Evidence

• CMS (2014 proposed rule)
  – “A number of studies demonstrate that improvements in care at the time of discharge can reduce 30-day readmission rates”
• Sharma et al\(^1\)
  – Follow-up with PCP had lower readmit rates (18.9% v. 21.4%)
  – Top reasons for readmits (COPD, pneumonia, infection, CHF)


Evidence

• Integrated care prevents hospitalizations for exacerbations in COPD patients\(^1\)
  – 12-month follow-up of readmits (49 v. 31%)
  – No 30-day readmit rate noted
  – No mortality difference
• GSuST: Glasgow supported self-management for patients with moderate to severe COPD\(^2\)
  – COPD readmission rate appears about 8% (both groups)
• BREATH: a comprehensive care management program to prevent COPD hospitalization\(^3\)
  – Stopped prematurely due to excess mortality in intervention group
  – COPD related hospitalization 27% v. 24% (intervention v. usual care)

DASH Program

- Transition of care program (DASH)
  - Discharge, Assessment, and Summary at Home
- Face to face visits (days 1, 30)
- In home, respiratory therapist driven
- Coordinated with hospital discharge planner
- Patients receiving home oxygen therapy
- Phone call supplements (up to 12 per month)

DASH Program

- Provision and setup of oxygen equipment
- Clinical assessment (overall, education, therapy)
  - Patient
  - Home
  - Ancillary services, support
- Education
- Activity monitoring (ADLs)
- Medication reconciliation (direct)
- Data collection


---

DASH Results

(March 2010-May 2011)

- COPD
  - Discharges 301
  - Overall 30 day readmission 26 (8.6%)
  - Readmission with COPD exacerbation 8 (2.6%)
  - Readmission for other cause 18 (6%)
    - eg, fall, chest pain, surgery, etc

- CHF
  - Discharges 57
  - Overall 30 day readmission 3 (5.2%)

Carlin BW, et al. Respir Care. 2011 (Meeting abstracts).
Transition of Care Results
Medication Use

28% of patients failed to be prescribed exacerbation reducing therapy

<table>
<thead>
<tr>
<th>Substandard</th>
<th>Standard</th>
<th>Best Practice</th>
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</thead>
<tbody>
<tr>
<td>MDI or ICS or None</td>
<td>LABA + LAMA or LAMA/ICS/OCS</td>
<td>LABA + LAMA or LAMA/ICS/OCS or LAMA alone</td>
</tr>
<tr>
<td>4/14</td>
<td>8/14</td>
<td>10/14</td>
</tr>
<tr>
<td>28%</td>
<td>57%</td>
<td>71%</td>
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</table>


Transition of Care Results
Risk factors emerge from data to predict performance

- Single visit ‘refusal’ readmit (13% vs 3%)
- ADL accomplishment has significant impact on readmit rates
- Dyspnea (Borg ≥ 3) a predictor for COPD readmits
- Patient satisfaction survey confirms ability to achieve motivation goal and disease management skills
DASH Network
Patient Centered and Includes Additional Providers

- Hospitals
- Pulmonary/Specialists
- Case Management
- Primary Practices

Referrals

Sub Acute
- SNF
- Assisted
- LTAC

- Respiratory
- HHA
- Sleep Lab
- Rehab/OT/PT

Home

Ancillary
- Tele-monitoring
- Nutrition
- Secretion Mgt
- Infusion

Transition of Care
“Pull” vs. “Push”

Project RED: Re-Engineered Discharge
- Patient comprehension of plan, appointments

Transition Coaching: 4 Pillars of Care
- Med mgt, health record, follow up, red flags

PAVE: Preventing Avoidable Episodes
- Patient self management “activation”
Pittsburgh Regional Health Initiative

Pittsburgh Regional Health Initiative Receives $10.4 Million Healthcare Innovation Award from CMS

PITTSBURGH—MAY 8, 2012 The Pittsburgh Regional Health Initiative (PRHI) is pleased to announce receipt of a $10.4 million Health Care Innovation Award from the Center for Medicare and Medicaid Innovation (CMMI) for its Virtual Accountable Care Network Project. Under the direction of Keith T. Kanel, MD — primary investigator for the project and PRHI’s Chief Medical Officer, the project builds on a PRHI-led hospital-physician pilot project that achieved a 44% reduction in readmissions for patients with chronic obstructive pulmonary disease (COPD). The findings from the pilot are currently being applied at Monongahela Valley Hospital and its aligned physicians by: (1) developing a shared-resource, hospital-based virtual patient-centered medical home – called a Primary Care Network (PCN); (2) creating a Regional Information Exchange (RIE) and (3) providing an evidence-based, standardized, staff education program.

Pittsburgh Regional Health Initiative

- Best practices (evidence based) developed
- Primary care resource centers (PCRC)
- Community hospitals (n=6)
- Management team (RN, RT, pharmacist)
- Identify and follow when admitted
- Standardized staff educational program
- Transition to home (in home visits)

Success Strategies
Forbes 2013

• Look for the opportunity nobody else sees
• Find partners who believe in you
• It’s easy to lose focus: DON’T
• Eventually you’ve got to say: Just Do It!

• “If you continue to cling to the past…”

Success Strategies

… you will never be able to create the future!!
The thirty day readmission rate for patients discharged following admission for a COPD exacerbation approaches:

1. 5%
2. 12%
3. 24%
4. 36%

A 55-year-old man with COPD and CHF is discharged from the hospital following a four-day admission for an exacerbation of COPD. He is fully ambulatory and states he is back to 80% of his baseline condition. He is discharged on a long-acting beta agonist/inhaled corticosteroid, a long acting muscarinic agent, a tapering course of prednisone, and supplemental oxygen therapy. Which of the following would provide him the most benefit as part of the discharge planning process?

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Thank you very much!!

bwcmd@yahoo.com
Abbreviations

ADL: Activities of Daily Life
CAD: Coronary Artery Disease
CHF: Congestive heart failure
CMS: Centers for Medicare and Medicaid Services
COPD: Chronic Obstructive Pulmonary Disease
DASH: Discharge, Assessment, and Summary at Home
FIM: Functional Independence Measure
HHA: Home Health Agency
ICS: Inhaled corticosteroid
LABA: Long-acting beta agonist
LAMA: Long-acting muscarinic antagonist
LTAC: Long-Term Acute-Care
MDI: Metered-Dose Inhaler
OCS: Oral corticosteroid
OT: Occupational therapy
PCP: Primary Care Provider
PCRP: Palliative Care Resource Professional
PT: Physical therapy
SNF: Skilled Nursing Facility
SOB: Shortness of breath
SpO₂: Oxygen Saturation via Pulse Oximetry

Acute Exacerbations of COPD:
Practical Strategies to Improve Outcomes and
Reduce Readmission

Review of Case
Mrs. P.

- 57-year-old woman with ischemic heart disease (prior stent placement), gastroesophageal reflux disease, hypertension, and severe COPD (FEV₁ = 45% of predicted)
- At baseline, she has a cough productive of white sputum and dyspnea on exertion at 30 meters
- Medications: cardioselective beta-blocker, short-acting beta₂ agonist, long-acting muscarinic antagonist, and a long-acting beta₂ agonist/inhaled corticosteroid combination agent

Mrs. P.

- Admitted with increased dyspnea (now at rest) and increased sputum production (now yellow)
- Denies chest pain or pressure
- Treated for an acute exacerbation of COPD with nebulized short-acting bronchodilators, systemic corticosteroids, and an oral antibiotic
- She improved and was discharged on hospital day #4
Mrs. P.

- Over the next 2 weeks, she has “good days and bad days”
- 16 days after discharge, she returned to the emergency department complaining of progressively worsening shortness of breath and increased cough, now productive of green sputum
- She required readmission to the hospital for further therapy and care

Which of the following interventions would have been the most likely to have reduced her risk of readmission?

A. Discontinue the systemic cardioselective beta-blocker
B. Ensure medication adherence with proper inhaler technique
C. Administer a 10-day course of an intravenous antibiotic
D. Provide an incentive spirometer to use 4-6 times/day

A. 93%
B. 5%
C. 2%
D. 0%
Follow-up for Mrs. P

• After further questioning, she reports “taking” the long-acting muscarinic antagonist with her other pills every night and inhaling the “other two puffers” as needed.

Summary and Wrap Up

Outcomes in AECOPD and relapse/ readmission rates can be improved

Thank you for your attention!