The Burden of Chronic Obstructive Pulmonary Disease (COPD)

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Scientific Communications

What Is COPD?

COPD is… Characterized by… That leads to…

A progressive disease Characterized by airflow limitation that is not fully reversible Inclusive of

- Chronic bronchitis
- Emphysema

Chronic cough Expectoration Dyspnea

Restricted activity Disability Poor quality of life

Definition of COPD

GOLD 2006

“COPD is a preventable and treatable disease with some extrapulmonary effects that may contribute to the severity in individual patients. Its pulmonary component is characterized by airflow limitation that is not fully reversible. The airflow limitation is usually progressive and associated with an abnormal inflammatory response of the lung to noxious particles or gases.”


Airflow Limitation and Hyperinflation in COPD

The major site of airflow limitation is in the smaller conducting airways (<2 mm in diameter) and is mainly due to airway remodeling (fibrosis and narrowing)
Loss of elastic recoil (due to destruction of alveolar walls)
Destruction of alveolar support (alveolar attachments)
Accumulation of inflammatory cells, mucous and plasma exudate in the bronchi
Dynamic hyperinflation during exercise
Smooth muscle contraction

Underdiagnosis of COPD

Approximately 24 Million Adults with Impaired Lung Function Based on Spirometry

COPD Is a Leading Cause of Morbidity and Mortality in the United States

Approximately 120,000 deaths in 2000

In 2005, 12.7 million US adults were estimated to have COPD:
- Chronic bronchitis (9.0 million)
- Emphysema (3.7 million)

Approximately 70% of COPD patients are < 65 years of age

Second only to heart disease as a cause of disability in Social Security statistics

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COPD Is the 4th Leading Cause of Death in the United States in 2003

<table>
<thead>
<tr>
<th>Cause of Death</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diseases of heart</td>
<td>685,089</td>
</tr>
<tr>
<td>Malignant neoplasms</td>
<td>556,902</td>
</tr>
<tr>
<td>Cerebrovascular disease</td>
<td>157,689</td>
</tr>
<tr>
<td>Chronic lower respiratory diseases</td>
<td>126,382</td>
</tr>
<tr>
<td>Unintentional injuries</td>
<td>109,277</td>
</tr>
<tr>
<td>Diabetes mellitus</td>
<td>74,219</td>
</tr>
<tr>
<td>Influenza and pneumonia</td>
<td>65,163</td>
</tr>
<tr>
<td>Alzheimer's disease</td>
<td>63,457</td>
</tr>
<tr>
<td>Nephritis, nephrotic syndrome &amp; nephrosis</td>
<td>42,453</td>
</tr>
<tr>
<td>Septicemia</td>
<td>34,069</td>
</tr>
<tr>
<td>All other causes of death</td>
<td>533,588</td>
</tr>
<tr>
<td>Total deaths</td>
<td>2,448,288</td>
</tr>
</tbody>
</table>


COPD Mortality Rate Increasing

Percent Change in Age-Adjusted Death Rates for Chronic Diseases, US, 1965-1998

-59% -64% -35% +163% -7%

*Cardiovascular disease

SOURCE: NHLS/NH/DHHS
Number of COPD-Related Deaths in Men and Women

Chronic Obstructive Pulmonary Disease Deaths—United States, 1999-2003


National Perspective

COPD is not only a disease of the elderly population

COPD prevalence is similar to that of asthma in individuals between 45 and 64 years

Frequency of Self-Reported Conditions: United States, 2005*

* COPD includes individuals reporting chronic bronchitis or emphysema

COPD - Defining Characteristics

Chronic bronchitis¹
- Clinical diagnosis
- Mucus-producing cough for 3 months in each of 2 successive years

Emphysema¹
- Pathologic diagnosis
- Irreversible enlargement of air spaces distal to terminal bronchioles
- Alveolar destruction

Spirometric diagnostic criteria
- Reduced ratio of FEV₁ to FVC (FEV₁/FVC<70%)¹²

Risk Factors

Primary: cigarette smoking
- History of tobacco use present in 80%-90% of cases\(^1\)

Secondary
- Occupational/environmental exposures\(^2,3\)
- Low birth weight in the presence of viral infection\(^3\)
- History of severe childhood respiratory infection\(^3\)
- Alpha-1 antitrypsin deficiency\(^3\)
  – Occurs in less than 2% of COPD population\(^4\)

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COPD and Co-Morbidities

COPD patients are at increased risk for:
- Myocardial infarction, angina
- Osteoporosis
- Respiratory infection
- Depression
- Diabetes
- Lung cancer

COPD has significant extrapulmonary (systemic) effects including:
- Weight loss
- Nutritional abnormalities
- Skeletal muscle dysfunction

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Clinical Features

Initially: cough, with or without sputum
Increased symptoms with respiratory tract infections
Progressive shortness of breath with activity
Ultimately: inability to perform activities of daily living, increasing episodes of symptom deterioration and exacerbations
End-stage findings: respiratory insufficiency, pulmonary hypertension, cor pulmonale


Making the Diagnosis

Early diagnosis and appropriate treatment are important to managing COPD.1

Diagnosis of COPD should be considered in any patient over the age of 40 years with2,3:
- A history of smoking
- Breathlessness
- Chronic cough with or without sputum production
- Respiratory infection that persists or recurs

Diagnosis should be confirmed by spirometry, which measures COPD-related decreases in lung function.2,3

### Differential Diagnosis of COPD vs Asthma

<table>
<thead>
<tr>
<th>Diagnostic Signs</th>
<th>COPD</th>
<th>Asthma</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age of onset</td>
<td>Usually &gt; 40 years&lt;sup&gt;1&lt;/sup&gt;</td>
<td>Any age (often in childhood)&lt;sup&gt;2&lt;/sup&gt;</td>
</tr>
<tr>
<td>Smoking history</td>
<td>Usually &gt; 20 pack-years&lt;sup&gt;1&lt;/sup&gt;</td>
<td>Non-smokers affected&lt;sup&gt;2&lt;/sup&gt;</td>
</tr>
<tr>
<td>Usual etiology</td>
<td>• Smoking history&lt;sup&gt;2&lt;/sup&gt;</td>
<td>Immunological stimuli, family history of asthma&lt;sup&gt;4&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td>• Occupational/environmental exposures&lt;sup&gt;2&lt;/sup&gt;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Low birth weight in the presence of viral infections&lt;sup&gt;2&lt;/sup&gt;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• History of severe childhood respiratory infections&lt;sup&gt;2&lt;/sup&gt;</td>
<td></td>
</tr>
<tr>
<td>Clinical features</td>
<td>• Persistent or worsening dyspnea; initially with exertion, eventually at rest&lt;sup&gt;2&lt;/sup&gt;</td>
<td>Symptoms vary, near-normal lung function between exacerbations&lt;sup&gt;2&lt;/sup&gt;</td>
</tr>
<tr>
<td>Inflammatory cell</td>
<td>Neutrophils&lt;sup&gt;2&lt;/sup&gt;</td>
<td>Eosinophils&lt;sup&gt;2&lt;/sup&gt;</td>
</tr>
<tr>
<td>Airway reversibility</td>
<td>Partially reversible&lt;sup&gt;2&lt;/sup&gt;</td>
<td>Largely reversible&lt;sup&gt;2&lt;/sup&gt;</td>
</tr>
<tr>
<td>Steroid response in stable disease</td>
<td>Little or no effect on inflammation&lt;sup&gt;4&lt;/sup&gt;</td>
<td>Inhibits inflammation&lt;sup&gt;5&lt;/sup&gt;</td>
</tr>
</tbody>
</table>


### COPD Ranks Behind Hypertension and Stroke in Total Cost Burden

The estimated cost of COPD in 2004 was $37.2 billion.

COPD: A Costly Disease for Managed Care Organizations

In managed care plans

- Annual respiratory-related hospitalizations
  - COPD: $5,230  Controls: $217
- Annual non-respiratory-related hospitalizations
  - COPD: $5,946  Controls: $3,631
- Total per-patient monthly healthcare charges for COPD patients compared to matched controls:
  - $2556 vs. $398 (45-54 age group)
  - $2650 vs. $580 (55-64 age group)


Cost of Undiagnosed COPD

Retrospective database analysis of 6,864 COPD patients and age and gender matched controls

- In 17.8% of the cohort COPD was first diagnosed during a hospitalization.
- Total costs increased by an average of $1,182 per patient in the two years before the initial COPD diagnosis and $2,489 in the twelve months just prior to the initial diagnosis.
- Mean annual healthcare costs were 24% to 36% greater than controls in the two years prior to diagnosis.

Hospitalizations Are a Major Cost Driver for COPD

Hospitalizations account for more than 60% of direct medical expenditures among COPD patients. Hospitalizations were 2.5 times higher among COPD patients than matched controls (27.2% vs. 10.7% p<0.001). Patients with COPD incur a mean length of stay of 4.7 days versus 3.9 days for control subjects (P < 0.001).


Most Frequent Diagnoses for Hospital Discharges Admitted Through the ED (Emergency Department)

<table>
<thead>
<tr>
<th>Principal Diagnoses for Hospital Discharges Admitted Through the ED</th>
<th>Total number of discharges (in thousands)</th>
<th>Percent of all discharges admitted through the ED</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Pneumonia</td>
<td>892</td>
<td>5.5</td>
</tr>
<tr>
<td>2. Congestive heart failure</td>
<td>768</td>
<td>4.7</td>
</tr>
<tr>
<td>3. Chest pain</td>
<td>722</td>
<td>4.4</td>
</tr>
<tr>
<td>4. Hardening of the heart arteries and other heart disease</td>
<td>566</td>
<td>3.5</td>
</tr>
<tr>
<td>5. Heart attack (acute myocardial infarction)</td>
<td>500</td>
<td>3.1</td>
</tr>
<tr>
<td>6. Stroke (acute cerebrovascular disease)</td>
<td>445</td>
<td>2.7</td>
</tr>
<tr>
<td>7. Chronic obstructive lung disease</td>
<td>445</td>
<td>2.7</td>
</tr>
<tr>
<td>8. Cardiac dysrhythmias (irregular heart beat)</td>
<td>433</td>
<td>2.7</td>
</tr>
<tr>
<td>9. Fluid and electrolyte disorders</td>
<td>393</td>
<td>2.4</td>
</tr>
<tr>
<td>10. Affective or mood disorders</td>
<td>336</td>
<td>2.1</td>
</tr>
</tbody>
</table>

### Most Common Comorbidities Among Hospitalized Patients

<table>
<thead>
<tr>
<th>Top 10 Comorbidities for Hospital Stays</th>
<th>Total number of cases with each comorbidity (in thousands)</th>
<th>Percent of all discharges</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypertension</td>
<td>11,104</td>
<td>29.4</td>
</tr>
<tr>
<td>Chronic obstructive lung disease</td>
<td>4,579</td>
<td>12.1</td>
</tr>
<tr>
<td>Diabetes mellitus</td>
<td>4,446</td>
<td>11.8</td>
</tr>
<tr>
<td>Fluid and electrolyte disorders</td>
<td>4,404</td>
<td>11.7</td>
</tr>
<tr>
<td>Iron deficiency and other anemia</td>
<td>2,997</td>
<td>7.9</td>
</tr>
<tr>
<td>Congestive heart failure</td>
<td>2,162</td>
<td>5.7</td>
</tr>
<tr>
<td>Hypothyroidism</td>
<td>2,120</td>
<td>5.6</td>
</tr>
<tr>
<td>Affective or mood disorders</td>
<td>1,757</td>
<td>4.7</td>
</tr>
<tr>
<td>Other neurological disorders</td>
<td>1,583</td>
<td>4.2</td>
</tr>
<tr>
<td>Obesity</td>
<td>1,346</td>
<td>3.6</td>
</tr>
</tbody>
</table>


### Burden of COPD Among Working Age Population

According to the CDC MMWR Report from Aug 2002:

- Approximately 70% of COPD patients were < 65 years of age
- In addition, COPD patients between 25 and 64 years of age accounted for:
  - 63% of emergency department visits for COPD
  - 46% of total hospital outpatient visits for COPD
  - 34% of COPD hospitalizations

Undiagnosed Patients Experience Symptoms That Impair Their Ability to Perform ADLs: Data from NHANES III


Workplace Impact

46.1% of patients with COPD were employed and:

- Missed an average of 4.6 work days in the previous 6 months
- Had suboptimum performance and productivity

Negative Impact on Health Status and Employment

COPD patients compared to those with asthma had:

- Lower current employment
- Greater likelihood of perceived inability to work
- Higher risk of perceived limitation in type or amount of work
- Poorer mental and physical health status.

COPD patients had a higher likelihood of depressive symptoms and poor sleep quality than those with other chronic conditions and asthma.


COPD Ranked Sixth Among the Most Costly Health Conditions to Employers in 1999

<table>
<thead>
<tr>
<th>Condition</th>
<th>Total Healthcare Payment Per Employee</th>
</tr>
</thead>
<tbody>
<tr>
<td>Angina Pectoris</td>
<td>$235.69</td>
</tr>
<tr>
<td>Essential Hypertension</td>
<td>$160.23</td>
</tr>
<tr>
<td>Diabetes Mellitus</td>
<td>$104.32</td>
</tr>
<tr>
<td>Mechanical Low Back Disorder</td>
<td>$90.24</td>
</tr>
<tr>
<td>Acute Myocardial Infarction</td>
<td>$69.23</td>
</tr>
<tr>
<td>COPD</td>
<td>$65.08</td>
</tr>
<tr>
<td>Back Disorder, Not Specified as Low Back</td>
<td>$63.50</td>
</tr>
<tr>
<td>Trauma to Spine and Spinal Cord</td>
<td>$62.16</td>
</tr>
</tbody>
</table>

*Based on data from 6 large employers; 374,799 employees

### COPD Guidelines*

**ATS/ERS 2004**

<table>
<thead>
<tr>
<th>Intermittent symptoms, e.g. cough, wheeze, exertional dyspnea</th>
<th>Short-acting bronchodilator pm, e.g. inhaled beta-agonist, anticholinergic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Persistent symptoms, e.g. dyspnea, night waking</td>
<td>Long-acting bronchodilator or short-acting agent qid, plus a pm relever</td>
</tr>
<tr>
<td>Limited benefit</td>
<td>Alternative class or combine classes (e.g. long-acting bronchodilator + inhaled corticosteroid)</td>
</tr>
<tr>
<td>Limited benefit/ Side-effects</td>
<td>Add/substitute oral theophylline</td>
</tr>
<tr>
<td>Role of inhaled steroids</td>
<td>Consider if FEV1 &lt;50% predicted &amp; if exacerbations requiring a course of oral steroids or antibiotics occurred at least once in the past year</td>
</tr>
</tbody>
</table>

**GOLD 2006**

<table>
<thead>
<tr>
<th>Stage I: Mild</th>
<th>Add short-acting bronchodilator when needed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage II: Moderate</td>
<td>Add regular treatment with one or more long acting bronchodilators, add rehabilitation</td>
</tr>
<tr>
<td>Stage III: Severe</td>
<td>Add inhaled corticosteroid if repeated exacerbations</td>
</tr>
<tr>
<td>Stage IV: Very Severe</td>
<td>Add long-term oxygen if chronic respiratory failure, consider surgical treatments</td>
</tr>
</tbody>
</table>

*Note: All guidelines emphasize the importance of smoking cessation and regular exercise.


### COPD Management Objectives

- Relieve symptoms
- Prevent disease progression
- Improve exercise tolerance
- Improve health status
- Prevent and treat complications
- Prevent and treat exacerbations
- Reduce mortality

Both ATS and GOLD guidelines recommend:

- Bronchodilators as first-line treatment for the management of COPD
- Inhaled corticosteroids use to be reserved only for specific sub-populations

Gaps in Pharmacotherapy vs Guidelines: Recommendations


Gaps in Pharmacotherapy vs. Guidelines: the Reality

Retrospective claims analysis of 23,596 COPD patients from a managed care research database:

- Only 58% of patients received bronchodilator therapy
- 32% received an anticholinergic
- 23% received an inhaled corticosteroid

Medical chart review of patients with obstructive lung disease showed that:

- COPD patients received 58.0% of recommended care
- Adherence to recommended medication prescribing was lower in COPD compared to asthma (58% vs. 81%).

Gaps in Pharmacotherapy vs Guidelines: the Reality

Analysis of 895 patients with COPD

74% received inhaled bronchodilator therapy

- 38% received an anticholinergic bronchodilator
- 55% received an inhaled corticosteroid

Majority of the patients did not feel knowledgeable about their disease (52.2%) or therapy (53.2%).


Opportunities to Improve Pharmacological Management of COPD

Better Utilization of Existing Therapies

Increased use of bronchodilator therapy, per guidelines1,2

Use of drugs that provide symptom relief and reduce exacerbations: a cost-effective way to improve health and well being of all patients

Utilizing agents with different modes of action can lead to improved outcomes1

Development of New Therapies that...

Offer improved symptom relief
Offer compliance advantages vs. existing products
Influence disease progression

**Section summary**

COPD is a leading cause of morbidity and mortality in the United States.

Total economic costs associated with COPD exceeded $37 billion in 2004.

Hospitalizations are a major cost driver for COPD.

COPD has a substantial impact on the working age population (direct and indirect costs).

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**Frequency and Cost of Disability among Employed Individuals with Chronic Obstructive Pulmonary Disease (COPD)**

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Pamela J. Kadlubek, MPH, i3 Innovus
Hemal Shah, Pharm.D., Boehringer Ingelheim
Amy L. Phillips, Pharm.D., Boehringer Ingelheim
Jenő P. Marton, M.D., Pfizer

Presented at the ISPOR 11th Annual International Meeting, Philadelphia, PA, May 20 - 24, 2006

Research funding provided by Boehringer Ingelheim Pharmaceuticals, Inc., and Pfizer Global Pharmaceuticals, Pfizer, Inc.
Study Purpose

The goal of the study was to quantify the impact of COPD on employees’ work productivity as measured by occurrence of disability and health care costs.

Specifically, the objectives were to compare actively employed individuals with COPD with a matched cohort of employees without COPD with regard to:
- Occurrence of short-term disability (STD), long-term disability (LTD), and any disability (STD or LTD)
- Cost of disability

Study Design

Retrospective database analysis

Data Source
- Disability, workers’ compensation, and health care claims data for 550,000 employees of nine multi-state companies

Study Period
- January 1, 2001 to March 31, 2004
Identification of Patients with COPD

Diagnosis of COPD between January 1, 2001 and March 31, 2004, defined as presence of at least one of the following:

- Primary diagnosis of COPD* on one inpatient medical claim
- Primary diagnosis of COPD on one emergency department medical claim
- Primary or secondary diagnosis of COPD on two outpatient medical claims no more than 360 days apart

* ICD-9-CM diagnosis codes used were:
- 491.xx – Chronic bronchitis
- 492.x – Emphysema
- 496 – Chronic airway obstruction NEC

Index date assigned as the latter of:

- Initial date of eligibility for all benefits (medical, STD, LTD)
- Date of the first COPD diagnosis

End of follow-up defined as earliest of:

- Non-active employee status
- Disenrollment from any benefit
- 365 days of follow-up
- End of data availability (i.e., March 31, 2004)
**Identification of Patients with COPD**

**Inclusion Criteria**
- Age between 40-63 years
- Continuous enrollment in the health plan and actively employed for at least 90 days following index date

**Exclusion Criteria**
- Any diagnosis of cystic fibrosis, lung cancer or tuberculosis during the study period
- Any claims of pregnancy during the study period
- Any workers’ compensation claims between index date and end of follow-up

**Identification of Controls**

No diagnosis of COPD during study period
Met all other study eligibility criteria as outlined for COPD cohort
Index date was defined as the beginning of the longest period of concurrent enrollment in all benefits (i.e., STD, LTD, health care)
Each identified patient with COPD was matched to up to two controls via propensity score, which was estimated on:
- Age
- Gender
- Geographic region
- Employer
- Length of employment
- Salary range
### Study Measures

**Outcome Variables**
- Short-term disability (STD)
- Long-term disability (LTD)
- Any disability (STD or LTD)
- Total indirect costs, calculated as total disability days multiplied by the employee's maximum daily wage during the study period

**Independent Variables**
- Length of follow-up
- Comorbid conditions, which were included in the multivariate models if:
  - Prevalent in $>1\%$ of study population
  - Unrelated to COPD
  - Significantly different between cohorts

### Statistical Methods

**Descriptive Analyses**
- Baseline characteristics compared between cohorts via Chi-square and t-tests

**Multivariate Analyses**
- Logistic regression to compare likelihood of having a disability claim
- GLM with a gamma distribution and log link to compare number of disability days and indirect costs among those with disability
- All models included as covariates length of follow-up and relevant comorbidities
**Patient Characteristics**

<table>
<thead>
<tr>
<th></th>
<th>COPD</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of subjects</td>
<td>1,349</td>
<td>2,696</td>
</tr>
<tr>
<td>Male, n (%)</td>
<td>688 (51.0%)</td>
<td>1,399 (51.9%)</td>
</tr>
<tr>
<td>Age, mean (SD)</td>
<td>52.1 (6.0)</td>
<td>51.9 (6.0)</td>
</tr>
<tr>
<td>Length of follow-up (days), mean (SD)*</td>
<td>220 (111)</td>
<td>233 (116)</td>
</tr>
</tbody>
</table>

* p = 0.0006

**Patient Characteristics**

- **Geographic Region**
  - Northeast
  - Midwest
  - South
  - West

- **Employer Type**
  - Air Transportation
  - Electronic Mfg
  - Food Mfg
  - Insurance
  - Telecom
  - Utilities

- **Years of Employment**
  - < 5
  - 5-9
  - 10-19
  - 20-29
  - 30+
  - Unk

- **Salary Range**
  - <$25K
  - $25K-$50K
  - $50K-$75K
  - $75K+</n

**COPD and control groups combined**
Selected Comorbid Conditions

- Respiratory Infections
- Hypertension
- Diseases of the Heart
- Dyslipidemia
- Asthma

p < 0.0001 for all comparisons

Presence of All-Cause Disability

- STD
- LTD
- Any Disability

p < 0.0001 for all comparisons
Likelihood of All-Cause Disability, Adjusting for Length of Follow-up and Comorbidities

Odds ratio and 95% confidence interval for COPD (right) vs. matched controls (left)

Mean All-Cause Disability Days, Adjusting for Length of Follow-up and Comorbidities

STD Days†: 51.3 vs. 44.0
Total Disability Days*: 58.6 vs. 44.9

* p = 0.014; † p = 0.161
Mean Indirect Costs, Adjusting for Length of Follow-up and Comorbidities

<table>
<thead>
<tr>
<th>COPD</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>$8,559</td>
<td>$5,443</td>
</tr>
</tbody>
</table>

* p = 0.07

A Burden on Employers

The study demonstrated that COPD patients had significantly higher health care utilization and costs than individuals without COPD.

* p<0.001 for all comparisons

Discussion

Nearly all comorbidities (occurring in > 1% of the population) were more common in the COPD cohort, including those not typically considered related to COPD, such as musculoskeletal conditions and injuries. Employees with COPD were more than twice as likely to have an STD claim, and more than four times as likely to have an LTD claim. It appears that employees with COPD were disabled longer, leading to more disability and higher indirect costs, although this needs to be confirmed within a larger study.

Limitations

Due to limited sample size when requiring a full 360 days of follow-up, it was necessary to allow for variable length of follow-up of less than 360 days.

- Subjects with more available follow-up had a greater opportunity for disability to occur.
- As controls had a longer average length of follow-up, this may have actually decreased the magnitude of the observed differences between the cohorts.

No data were available with regard to presenteeism or absenteeism that did not lead to disability.
Conclusions

Within a population of actively employed individuals between 40 and 63 years of age, COPD was found to have a substantial impact on both frequency and cost of disability. The economic burden of COPD not only is seen in the older, retired population but also is clearly present in the working population. Health management programs to prevent and proactively treat COPD should be considered to minimize this burden.

Research measuring the impact of these health management programs on COPD-related disability would provide valuable information.

Worksite Health Improvement Initiative

Southwest Airlines

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Associate Director
Health Management Resources
Boehringer Ingelheim Pharmaceuticals

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Worksite Health Improvement Initiative:
Lung Health Screening Event
September 26, 2007

Program Components

- Lung Health Screening: US Wellness (September 26, 2007)
- Distribution of COPD educational materials to screening participants
- Analysis of Southwest Airlines COPD-related medical claims data performed by SWA's claims administrator, United HealthCare (September 2007)
- Project report (January 2008)
- Employee educational program conducted by a trained medical professional at SWA Headquarters ("Lunch & Learn" to be scheduled in 2008)
- SWA Case Study Presentation for DFW area employee benefits managers at DFWBGH
- Corporate Benefits Forum (to be scheduled in Spring 2008)
Key Discoveries

• SWA population shows higher than average exposure to second-hand smoke
• Abnormal lung function prevalence identified in working age group
• Smaller number of employees with COPD vs asthma associated with higher dollar costs per employee
Lung Health Screening Report

Prepared by US Wellness, Inc.

Event Location: TX
Event Date: 9/26/2007
Qualified No. Screened: 360
Below Normal Results: 75
Patients with Ratio less than 70%: 23
Percentage Of Participants with abnormal results: 20.83%
Percentage of Patients With Ratio Less Than 70%: 6.39%

* 23 persons, or 6.39% had FEV1/FVC, a measure comparing how much air a person can expel in one second to the total volume of air that can be expelled, results that were less than 70% predicted based on the person's age, height, weight, and gender. Abnormal spirometry is defined as pre-bronchodilator results FEV1/FVC < 70% or FEV1 < 80% predicted.
* 64 reported being past smokers and 34 reported being current smokers.
* There were 201 females and 154 males screened; abnormal results were 36 and 37 respectively.
* 29% were between ages 40-49.
* 38 reported that they were experiencing symptoms associated with lung impairment.
* 73 have sought medical treatment within the last 15 months.
* 28 have reported receiving a medication.

Southwest Airlines Employee Testimonials

“...have been a smoker for 35 years and have attempted to quit smoking several times. I have actually been in the process of cutting down for the last 6 weeks but broke down and bought a pack last night. I find out that I have the lungs of a 72-year-old was a very rude awakening..." I needed”

“I am very happy I had my lung health screening done today. I’ve received very good news!”

“This was a lot of fun. I am ready to do it all over again!”

“This was a lot harder than I thought!”

“This was a good experience and really educational!”

“This was my first time getting a lung health screening and there was a lot of really good information and great cheerleaders!”

“This is a lot harder than it looks!”
Southwest Airlines Employee Testimonials

“I’m 26 years old and have been smoking for 10 years. I am really surprised with how poor my lung function results were. I can’t believe that I have the lungs of a 60 year old. I know I need to quit smoking.”

“My dad died of lung cancer and my mom was diagnosed with COPD in her mid 40’s. I’ve been smoking for almost 25 years. I’ve tried to quit before but it’s really been hard for me. This program has helped me realize even more that I need to quit and how much smoking affects my health.”

Lung Health Screening Report

Exposure to Second Hand Smoke: 55.83% vs. U.S. Wellness National Average: 26%
Smoking:
The Primary Risk Factor

- History of smoking or exposure to smoking is present in 80% to 90% of COPD cases


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Beginning to Create the Whole Picture

Southwest Airlines Dallas Employees: 2006-2007

**Total COPD: 56**
Cost $43,061.19
Visits: 50

**Total Asthma: 175**
Cost $44,411.74
Visits: 202

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COPD Ranks Behind Hypertension and Stroke in Total Cost Burden

Cost Burden of Select Diseases

- COPD costs nearly 2.5 times as much as asthma and is associated with far greater mortality than asthma.
- Direct costs are defined as diagnosis and disease management.
- Indirect costs are defined by absenteeism and reduced productivity.

Starting to Create the Whole Picture

Southwest Airlines National Data: 2006-2007

Total COPD: 269 Cost $112,228.74 Visits: 307
Total Asthma: 778 Cost $213,320.82 Visits: 952

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Total $325,549.56 1,047 1,259
Worksite Health Improvement Initiative: Next Steps

- Lunch and Learn Employee Education: Importance of Smoking Cessation, Recognizing COPD, Screening for COPD
- Educational Tools
- Reinforcement of Educational Initiatives (Collaborative effort in messaging: Disease Management, Case Management, State, Physicians)