

# Chronic Obstructive Pulmonary Disease: The Impact Occurs Earlier Than We Think

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## AUDIENCE

This activity is designed for primary care physicians and others who care for patients with chronic obstructive pulmonary disease (COPD), care managers, and health plan leaders.

## GOAL

To review the latest research into the economic and social burden of the escalating numbers of COPD cases and to present information on how to apply practical guidelines that can

positively impact the prevention and progression of the disease by early detection and intervention.

## EDUCATIONAL OBJECTIVES

Upon successful completion of this educational program, the reader should be able to:

1. Assess the economic and social impact of COPD in the US.
2. Discuss the value of early diagnosis and intervention in patients with COPD.
3. Recognize the importance of smoking cessation in altering the course of COPD.

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## Accreditation

The University of Pennsylvania School of Medicine is accredited by the Accreditation Council for Continuing Medical Education to provide continuing medical education for physicians.

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The estimated time to complete this activity is 1 hour.

This CME activity was produced under the supervision of Katrina Armstrong, MD, MSc, Assistant Professor of Medicine and Clinical Epidemiology and Senior Scholar, Center for Clinical Epidemiology and Biostatistics, University of Pennsylvania School of Medicine.

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**Objective:** To determine the socioeconomic, demographic, and clinical utilization characteristics of the "typical" patient with chronic obstructive pulmonary disease (COPD).

**Study Design:** Retrospective analysis of a large dataset of patients enrolled in a disease management program for COPD.

**Patients and Methods:** Patients were 2129 individuals with a diagnosis of COPD. Information was collected at the time these individuals entered the National Jewish Medical and Research Center disease management program for COPD.

**Results:** The data show that the typical stereotype of a COPD patient (ie, elderly and unemployed) may not apply to a large proportion of patients already diagnosed with COPD. Almost half (49.7%) were less than 65 years old. In addition, 46.1% were employed and missed an average of 4.6 days of work in the previous 6 months.

**Conclusions:** The cost of COPD to individuals and to society is increasing. Yet it is a potentially preventable and treatable disease. Early detection and intervention are essential.

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Chronic obstructive pulmonary disease (COPD) is a progressive, insidious disease that begins long before the diagnosis is made. Because symptoms may be minimal or attributed to aging, most people do not seek help until they have lost enough lung function to make them short of breath when they perform activities of daily living. For sedentary individuals, this may not occur until they have lost more than 50% of their lung function. Before their presentation, however, most patients already will have experienced a decline in the performance of work and leisure activities,<sup>1</sup>

the former reflected in lost workdays and decreased productivity; the latter in a decrease in their quality of life. COPD results in high physical and emotional costs to individuals, and high economic costs to individuals, employers, and society.

Approximately 16 million people in the United States have been diagnosed with COPD. An estimated 14 million have undiagnosed COPD. The disease is the 4th leading cause of death in the United States, with associated direct and indirect costs to society and the health-care system in excess of \$32 billion a year,<sup>2</sup> a figure that may not reflect the cost to society of treating the uninsured and the as yet undiagnosed. Each year COPD directly results in 100 000 deaths in the United States and an estimated 3 million deaths worldwide.<sup>3</sup> In addition, COPD is an indirect cause of death as a comorbidity in many other primary disease states. These figures do not capture the secondary costs of COPD for the family, spouse, or other caregiver.

The diagnosis and treatment of COPD are too often hindered by erroneous beliefs about the disease. It is both underdiagnosed and misdiagnosed as asthma in many cases. Many individuals, both physicians and patients, still conceive of COPD as an untreatable disease—predominantly of elderly men. This misconception often leads to underestimation of the importance of early diagnosis and intervention. Many physicians and healthcare officials remain unaware that COPD is both preventable and treatable, like a variety of other chronic diseases, including heart disease and diabetes.

In 1998, the National Jewish Medical and Research Center developed and operationalized a telephone-based disease management program for COPD. During the last 4 years, this program has attempted to learn more about the characteristics of patients with COPD and to disseminate this information to health plans and healthcare providers in an effort to raise awareness of the early features of this disease.

Although COPD commonly is thought of as a disease of elderly, unemployed persons,<sup>4</sup> an analysis of our disease management program database allowed us to look carefully at many of the defining characteristics of the typical person with COPD. This report presents the results of that analysis.

## METHODS

Provided with information on health plan enrollees, we identified patients with COPD on the basis of diagnosis-related groups, pharmaceutical use, and claims-based utilization of medical services, and offered them the option of enrolling in the National Jewish Medical and Research Center disease management program for

COPD. (This program is offered by individual health plans as a benefit to their members.) The predominant *International Classification of Diseases, 9th Revision* (ICD-9) codes used to identify patients with presumed COPD were 491, 492, and 496. Participation in this disease management program was voluntary and free. Individuals were given the option to participate or not before any data gathering or educational sessions.

A total of 7011 individuals were referred to the COPD disease management program for potential participation. For a variety of reasons, we were not able to reach and interview many of those referred. The most common reason for not conducting an interview was “unable to reach” because of no telephone or a wrong number, accounting for more than 50% of the people not included in the program. We were able to contact and interview 2129 people. Once permission was obtained, a 1-hour telephone interview conducted by a respiratory specialist nurse, who gathered information on the patient’s medical history, current health, and socioeconomic status. The records of these 2129 individual interviews were summarized and analyzed.

Using retrospective statistical analysis of data collected in initial interviews, we sought to characterize the typical COPD patient and delineate the range of demographic variability.

Pulmonary function results were not available for each patient. Therefore, we were unable to apply the Global Initiative for Chronic Obstructive Lung Disease (GOLD) guidelines for COPD severity.<sup>3</sup> Instead, we developed and applied a classification system for internal use, based on functional capacity and previous utilization of health care services (Table 1).

## RESULTS

Of the 2129 patients interviewed, 47% were men and 53% were women. All patients had a physician diagnosis of COPD, and the majority had moderate or severe disease, as determined by resource utilization and functional capacity.

Almost half of the patients (49.7%) were younger than age 65 years (Table 2). Nearly one third of the patients with moderate or severe disease were younger than age 59 years. Our typical COPD patient tended to have more severe disease, as measured by functional impairment, but there was a wide range of severity of disease (mild = 25.7%, moderate = 32.8%, severe = 41.5%).

Of the total population, 46.1% were employed (the employment rates for those younger than age 65 years and those younger than age 55 years were 56.3% and 62.8%, respectively). They missed an average of 4.6 days of work during the 6 months before enrollment

**Table 1.** Classification of COPD Severity\*

Criterion <sup>†</sup>	Level 3 (Severe)	Level 2 (Moderate)	Level 1 (Mild)
ICU for COPD	1 or more	None	None
Hospitalization (COPD related)	2 or more	1	None
ED or urgent-care center visits for emergency COPD treatment	2 or more	1	None
Missed days from work	More than 2 weeks or unable to work due to respiratory disease	3 days to 2 weeks	0-2 days
Functional status	Dependent for ADLs	No longer able to fully engage in previous activities	Independent
Dyspnea	Minimal activities like dressing, washing	Moderate activities like climbing stairs	Strenuous activities like running
Oxygen	Any supplemental oxygen requirement	No requirements	No

ADLs indicate activities of daily living; COPD, chronic obstructive pulmonary disease; ED, emergency department; ICU, intensive care unit.

\*Note: Patients were considered to have severe disease if they met any level 3 criteria; moderate disease, if they met any level 2 criteria; and mild disease, if they met any level 1 criteria.

<sup>†</sup>Patients were assessed during the 6 months before enrollment in the disease management program.

(total loss in this population of 4366 days). It is not unreasonable to assume that many workdays were characterized by suboptimum performance and productivity as a direct result of COPD symptoms. The often-unremitting nature of burdensome symptoms, the impact of these symptoms on normal daily life, and the demonstrated increase in healthcare utilization suggest that the diminished productivity might be considerable. Of the individuals less than 65 years of age who were in the program, 24.4% were unable to work, at all because of their respiratory disease.

The vast majority of patients were either active cigarette smokers or had smoked within the last 2 years (90.4%). Of those who were actively smoking at the time of enrollment (60.5%), 62.3% were smoking more than 1 pack of cigarettes a day at the time of the call. The average number of pack-years was 41.5 years.

Although airflow obstruction and the symptoms that result from it are the most notable manifestations of COPD, this disease is invariably associated with a number of extrapulmonary diseases that contribute to increased morbidity and even to mortality. This was the case for our typical patient with COPD; 35.4% of those

interviewed had a comorbid state (Table 3). The most common comorbidity was cardiovascular disease (59.4%). However, the typical patient was also likely to have diabetes (16%), clinical depression (22.9%), and/or some type of peripheral vascular problem (20.4%).

The typical patient reported significant utilization of medical resources during the 6-month period just before enrollment. Of the total population, 29.1% had been hospitalized, with an average stay of 3.8 days. Only 15.2% had an emergency room visit, but nearly 30% had an unscheduled physician visit related to their illness. For treatment of a COPD exacerbation, the typical patient had almost a 100% likelihood of receiving an antibiotic; most received oral steroids as well (77.3%).

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**DISCUSSION**

COPD is the 4th leading cause of mortality nationwide and results in significant human, societal, and economic burdens. The prevalence and morbidity data underestimate the societal impact of the disease, as it generally is not diagnosed until it is moderately advanced. We performed a retrospective analysis of

**Table 2.** Patient Characteristics

Age, y	Men	Women	% Total Patients
<50 (n = 119)	40	79	5.6
50-54 (n = 184)	71	113	8.6
55-59 (n = 353)	151	202	16.6
60-64 (n = 403)	193	210	18.9
65+ (n = 1070)	551	519	50.3

patient demographics upon entry into our COPD disease management program and tracked COPD-related physician contacts within the preceding 6 months.

Our results indicate that COPD is not just a disease of the elderly. These results are somewhat different from those of Strassels et al, who reported that the typical COPD patient was more than 65 years old and had limited work loss directly related to his or her disease.<sup>4</sup> Our data, drawn from a population of individuals with a previous diagnosis of COPD referred from managed care health plans to a specific disease management program, may be significantly different because of a population selection bias. However, the data from our population sample of more than 2000 individuals support the recommendation for earlier COPD screening in all patients more than 40 years old who smoke and in individuals of any age with chronic respiratory symptoms. In the overwhelming majority of patients with COPD who continue to smoke cigarettes, the rapid loss of lung function is clearly attributable to ongoing exposure to cigarette

**Table 3.** The Typical COPD Patient

1.	Is a cigarette smoker and continues to smoke in the presence of moderate to severe disease.
2.	Is just as likely to be female as male (male = 47.3%, female = 52.7%), a turnabout witnessed only during the past 10-20 years.
3.	Is more than 40 years old.
4.	Is just as likely to be employed as unemployed.
5.	Is just as likely to be less than 65 years old (49.7%) as more than 65 years old (50.3%), but the majority of patients with moderate or severe disease are more than 60 years old.
6.	Was not diagnosed in the early stages of the disease. Among the group of patients entering the COPD disease management program, only 26% had mild disease.
7.	Utilizes healthcare services significantly more often than same-age individuals in the general population.

COPD indicates chronic obstructive pulmonary disease.

smoke. The rate of loss of forced expiratory volume in 1 second in heavy smokers is commonly 3 times that seen with normal lung aging.

Early identification of persons with COPD allows for sustained efforts at smoking cessation and, as demonstrated by Fletcher and Peto,<sup>5</sup> a dramatic reversal of the accelerated loss of lung function to a rate of loss comparable to that in individuals who have never smoked. This reversal is associated with increased life expectancy, reduced morbidity, and enhanced quality of life. By potentially facilitating reversal of symptoms, early identification and intervention can alleviate the human, societal, and economic burdens of COPD.

Cigarette smoke, the most important of all risk factors, is the cause of COPD in more than 95% of cases. Other risk factors include environmental (primarily work) exposures, low socioeconomic status, and frequent respiratory infections in infancy and childhood. COPD is a preventable, modifiable, and treatable disease; its course is not necessarily progressive and inexorable. Treatment of COPD, as delineated by the GOLD standards,<sup>3</sup> is a 4-step process:

1. Diagnose, assess, and monitor the disease.
2. Reduce the risk factors.
3. Manage stable COPD through education, drug therapy, and nonpharmacologic methods.
4. Manage exacerbations.

COPD occurs in individuals younger than age 65 years more often than is generally assumed. Furthermore, because of the increase in smoking among women in the last 40 years, COPD is no longer a disease seen predominantly in men. (More than half of the individuals with COPD interviewed for this study were women.) If we are to slow or halt progression of this disease, we must expand the present focus on the older population, the majority of who *self-present* with the signs and symptoms of moderate to severe disease, to a much younger population of persons deemed to be vulnerable based on 1 or more risk factors. We cannot afford to wait for self-presentation, but must aggressively institute screening measures to identify those at risk and engage in early intervention.

A large percentage of patients with COPD are unable to work, and those who do work miss a lot of days as a result of their respirato-

ry disease. This situation is of great concern to the individual worker who may lose his job as a consequence of excessive absenteeism and to the employer whose business may fail to thrive as a consequence of reduced worker productivity. It also should be of great concern to us as a society, for we ultimately must bear the brunt of direct and indirect costs attributable to this disease: increased healthcare expenditures, increased individual dependency, and lost productivity.

A goal of treatment is to minimize time lost from work because of illness. In accordance with the GOLD standards, provision of optimal pharmacotherapy, identification and treatment of hypoxia, provision of a written action plan that in concert with a sound physician-patient relationship will facilitate early intervention at the first sign(s) of an exacerbation, recognition and treatment of comorbid conditions, and participation of every patient in a comprehensive pulmonary rehabilitation program<sup>6,7</sup> all are a means to that end.<sup>3</sup>

Patients with COPD often continue to smoke after symptoms begin, thus perpetuating the accelerated progression of the disease. We must do more to engage our patients in smoking cessation programs that include both pharmacologic aids to smoking cessation and individual counseling. Physicians must, respectfully but firmly, suggest to every cigarette-smoking patient that he or she consider smoking cessation and should make that recommendation at every visit. To be effective, the physician must avoid personal criticism, moralizing, and expressing frustration, anger, annoyance, and disrespect. Physicians must carefully identify the impediments to cessation for each individual and address them. For the patient to seriously consider, accept, and implement physician advice, he or she must trust and respect the physician and consider their relationship to be a partnership. The patient must believe that smoking is *their* problem and that the solution will require a collaborative effort.

COPD is a highly prevalent, insidious, underdiagnosed disease with a long interval between the onset of

disease and the clinical presentation. Although clinically occult for decades, it is readily and inexpensively diagnosed. With the use of simple spirometry, especially when focused on high-risk populations (ie, cigarette smokers, those with a strong family history of emphysema,<sup>8,9</sup> those with industrial exposures to high concentrations of toxic irritants, those with chronic respiratory symptoms), effective early diagnosis is possible.

Although all patients with COPD have some features in common, the clinical presentation is highly variable. With few exceptions, all patients have 1 or more risk factors related to environmental exposures, host factors, such as a genetic disposition, or both. We hope this information will raise physicians' awareness of the risk factors for COPD so that they may more readily identify persons at heightened risk for COPD and will be encouraged to utilize symptom history, family history, and simple spirometry for earlier diagnosis.

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