The Impact of COPD on Lung Health Worldwide*

Epidemiology and Incidence

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Information on the prevalence of COPD was obtained from vital statistics, health interview surveys, hospital charge records, national publications, and the World Health Organization (WHO). These data indicate that COPD is a common disease with implications for global health. In the United States, morbidity caused by COPD is 4%, making COPD the fourth leading cause of death, exceeded only by heart attacks, cancer, and stroke. Internationally, there is substantial variation in death rates possibly reflecting smoking behavior, type and processing of tobacco, pollution, climate, respiratory management, and genetic factors. The Global Obstructive Lung Disease Initiative, initiated by the National Heart, Lung, and Blood Institute and the WHO, aims to raise awareness of the increasing burden of COPD, decrease morbidity and mortality, promote further study of the condition, and implement programs to prevent COPD.

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Abbreviations: ICD = International Classification of Disease; NHLBI = National Heart, Lung, and Blood Institute; WHO = World Health Organization

COPD is a common, costly, and preventable disease that has implications for global health. It is the fourth leading cause of death in the United States, exceeded only by heart attacks, cancers, and stroke (Table 1).[1] Among 28 industrialized countries, the United States ranks 12th in COPD mortality for men and seventh for women. It has been estimated that by the year 2020, COPD will be fifth among the conditions that will be the highest burden to society on a worldwide scale.[2] Hospitalization rates are rising dramatically. Economic costs are enormous, estimated at > $14 billion in the United States. At best, current treatments, although very valuable in selected patients, are only palliative.

Information about COPD is available from vital statistics, health interview surveys, and hospital discharge records from national publications in the United States and from statistics provided by the World Health Organization (WHO). However, problems interpreting measures of the frequency of disease and death in the population—especially with intercountry comparisons—are enormous with COPD. The term itself is used in a variety of ways, leading to misclassification and omission from medical records and vital statistics when it is judged to be a contributing, but not main, cause of death. Thus, data on morbidity and mortality from COPD must always be interpreted with caution.

Course of Disease

In the mid-1980s, the National Heart, Lung, and Blood Institute (NHLBI) initiated a long-term, mul-

Table 1—*Leading Causes of Death, United States, 1996**

Cause of Death	No. of Deaths
Heart disease	733,834
Cancer	544,278
Cerebrovascular disease (stroke)	160,431
COPD and allied conditions	106,146
Accidents	93,874
Pneumonia and influenza	82,579
Diabetes	61,559
HIV infection	32,655
Suicide	30,862
Chronic liver disease	25,135
All other causes of death	451,168

*Adapted from: Vital Statistics of the USA, National Center for Health Statistics.[1]

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Table 2—*Estimated Prevalence of Chronic Bronchitis, Emphysema, and Asthma in the United States, 1970, 1986, and 1994**

		Total Population											
		No. (× 1,000)			No. per 1,000			Men, No. per 1,000			Women, No. per 1,000		
Condition	ICD/9 Code	1970	1986	1994	1970	1986	1994	1970	1986	1994	1970	1986	1994
Chronic bronchitis	490, 491	6,526	11,379	14,021	32.7	48.1	54.0	31.2	41.2	44.5	34.0	54.7	63.1
Emphysema	492	1,313	1,998	2,208	6.6	8.5	7.8	10.3	10.5	9.7	3.1	6.5	6.0
Asthma	493	6,031	9,690	14,562	30.2	41.0	56.1	31.7	40.8	51.7	28.8	41.1	60.2

*Adapted from: National Center for Health Statistics, 1973, 1974, 1986a, 1987, 1995, 1997.[1]

ticenter project, the Lung Health Study, to determine whether a program incorporating smoking intervention and the use of an inhaled bronchodilator can slow the rate of decline in FEV_1. The study followed nearly 6,000 male and female smokers aged 35 to 60 years with mild obstructive pulmonary disease. Major study results were reported in November 1994.[3] An aggressive smoking intervention program significantly reduced the age-related decline in FEV_1 in middle-aged smokers with mild airways obstruction. Use of an inhaled anticholinergic bronchodilator resulted in relatively small improvements in FEV_1, which appeared to be reversed after the drug was discontinued. Use of the bronchodilator did not influence the long-term decline of FEV_1.

Since the publication of that major study outcome, much has been learned about the study population. For example, from data already analyzed, > 2% of the patients screened for the Lung Health Study developed lung cancer. Although success in smoking cessation can protect lung function in a group at high risk of developing a progressive decline in FEV_1 as a prelude to symptomatic COPD, a 5-year sustained smoking cessation rate was very hard to achieve despite the intensive interventions. This underscores the need to increase efforts at prevention of smoking. There is also a need to continue to explore approaches for early detection of disease, including pulmonary function measures, biochemical or immunologic tests, or identification of genetic markers of susceptible smokers.

Magnitude of the Problem in the United States

Prevalence

Data on the prevalence of COPD depend on multiple factors, such as diagnostic criteria, potential confounding conditions, the need to make appropriate age adjustments, and the requirement to make adjustments for revisions in the International Classification of Disease (ICD) codes. Thus, estimates of the frequency and distribution of COPD tend to be inadequate and incomplete. In the United States, estimates of prevalence have been developed from responses to standard questions asked of representative samples of the civilian noninstitutionalized population in the National Health Interview Surveys from the National Center for Health Statistics (Table 2).[1] In 1994, there were estimated to be 14.021 million men and women with chronic bronchitis, 2.208 million with emphysema, and 14.562 million with asthma. Rates (unadjusted for age) of reporting emphysema were higher for men than women, whereas rates of reporting chronic bronchitis and asthma were higher for women than men. Table 2 also shows larger numbers of affected persons and higher rates of reporting of these conditions in 1994 than in 1986 and 1970 for both chronic bronchitis and asthma; rates of emphysema declined in 1994 compared with previous years in both men and women.

Visits to Physicians

In 1995, > 16 million visits were made to doctors' offices for the treatment of conditions the principal diagnoses of which were listed as COPD and allied conditions (up sharply from the 9.3 million reported in 1985).[1] Among the first listed, or principal, diagnoses of chronic respiratory disease, bronchitis was the most frequent (10 million visits), and chronic airways obstruction was second most frequent (4 million visits). These numbers are based on the National Ambulatory Medical Care Survey and apply to office visits, not to individual patients. The same survey indicated that there were 9 million office visits for asthma in 1995.

Hospitalizations

Between 1970 and 1995, in the United States, COPD hospitalization rates varied considerably, although the reasons for this variation are not clear. Hospital discharge data from the National Center for Health Statistics relate to numbers and rates of discharges for related conditions according to

Table 3—*Number of Deaths From COPD and Allied Conditions in the United States, 1985 and 1995**

Cause of Death	ICD-9 Code	No. of Deaths 1985	No. of Deaths 1995
COPD	490–496	74,762	102,899
Bronchitis, chronic and unqualified	490, 491	3,615	3,228
Emphysema	492	14,150	16,927
Asthma	493	3,980	5,637
Chronic airways obstruction, NEC*	494–496	53,007	77,107

*NEC = not elsewhere classified. Adapted from NHLB1 morbidity and mortality chartbook, 1998.[1]

whether they are listed as first or as a subordinate cause of hospitalization. Unfortunately, discharges for individual patients admitted more than once in the course of the year cannot be linked. For the entire group of conditions, there were 553,000 discharges with COPD or allied conditions given as the first listed diagnosis; more than half of these were coded as bronchitis, chronic and unqualified, ICD codes 490 and 491.[1]

Mortality

COPD accounted for 4% of all deaths in the United States in 1995, fourth highest among causes of death (Table 1). The numbers of deaths attributed to COPD in 1985 and 1995 are shown in Table 3, which provides information on the specific conditions entered on death certificates for COPD deaths. In 1995, the age-adjusted death rate per 100,000 population was 54.7 for white men, 42.5 for black men, 31.4 for white women, and 15.6 for black women. Although highest in white men, COPD mortality rates for white men have remained relatively constant since the 1980s. During the same period, the rate gradually increased in black men but doubled in white women and in black women.[1]

Time Trends in Morbidity and Mortality From COPD in the United States

Although COPD is a leading cause of illness and death, its recognition as a public health problem has been slow to evolve despite the rising mortality rate for COPD and the decline in death rates for most of the cardiovascular diseases. For example, between 1966 and 1995, the age-adjusted death rates for coronary heart disease and stroke declined by 45% and 58%, respectively, whereas the death rate for COPD increased by 71%.[1]

International Comparisons of COPD Mortality and Morbidity

Death rates for COPD and allied conditions for men and women aged 35 to 74 years are shown by country for the latest year available from the WHO (Fig 1). Among 28 industrialized countries, the United States ranks 12th in COPD mortality for men and seventh for women. Taken at face value, these

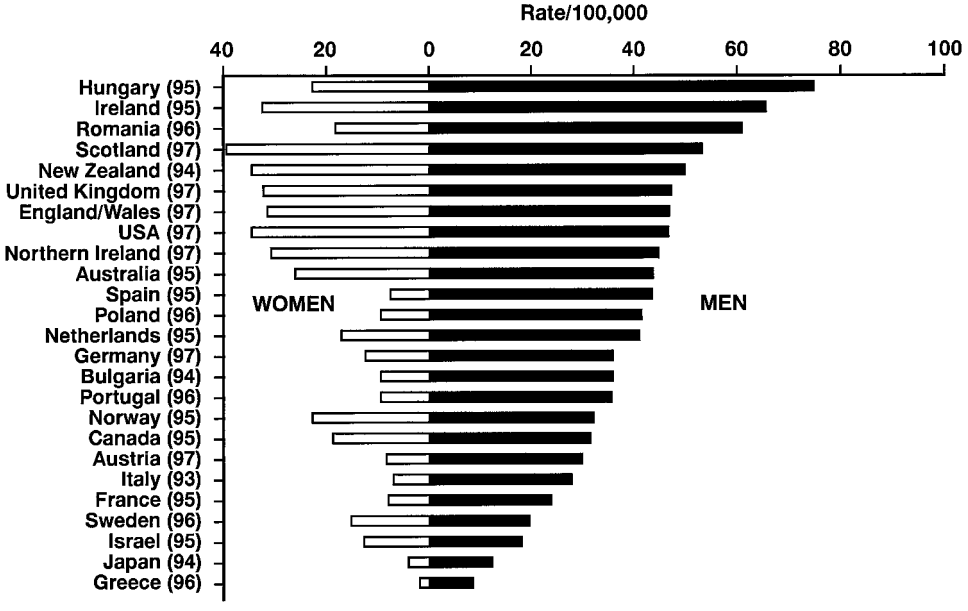

FIGURE 1. Age-adjusted death rates for COPD by country and by sex, ages 35 to 74 years (adapted from World Health Statistics Annual, WHO, unpublished).

data indicate substantial variation among countries for both sexes. Death rates were lower among women than among men in every nation. Differences in COPD death rates among countries have attracted considerable attention, with multiple hypotheses suggested including smoking behaviors, type and processing of tobacco used in cigarettes, outdoor and indoor pollution, climate, frequency and management of respiratory infections, and genetic factors. However, the lack of standardization of death certification and coding practices as well as differences in diagnostic practices and availability and quality of medical care in different countries severely curtails the interpretation of the data.

Global Obstructive Lung Disease Initiative: International Program on COPD

The projected increase in smoking rates throughout the world has led to the recognition that COPD will increase as a global burden of disease. Thus, the NHLBI, in cooperation with the WHO, has initiated a program called the Global Obstructive Lung Disease Initiative. The objectives of this initiative are the following: to bring the importance of the rising burden of COPD to the attention of public health officials, the medical community, and the general public; to decrease morbidity and mortality from COPD through implementation and evaluation of effective programs for diagnosis and management; to promote study into reasons for the increasing prevalence of COPD, including its relationship with the environment; and to implement effective programs to prevent COPD. A panel of experts, working with existing COPD guidelines from multiple countries, is developing a program document that will be available for distribution by early 2000. At that time, the NHLBI and the WHO will collaborate on its dissemination.

Summary

COPD is the only leading cause of death that is increasing in prevalence. Although it is known that cigarette smoking is the major cause of this disease and, therefore, that COPD largely is preventable, COPD is already a major burden on the health-care community, a burden that will continue to escalate around the world in the next century. Work is under way, through an NHLBI/WHO Global Obstructive Lung Disease Initiative, to bring information about COPD to public health officials, the medical community, and the public. However, more effective methods are required for early detection of disease.

References

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