

Gender Differences in Symptoms and Care Delivery for Chronic Obstructive Pulmonary Disease

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Abstract

Background: Morbidity and mortality for women with chronic obstructive pulmonary disease (COPD) are increasing, and little is known about gender differences in perception of COPD care.

Methods: Surveys were administered to a convenience sample of COPD patients to evaluate perceptions about symptoms, barriers to care, and sources of information about COPD.

Results: Data on 295 female and 273 male participants were analyzed. With similar frequencies, women and men reported dyspnea and rated their health as poor/very poor. Although more women than men reported annual household income <\$30,000, no significant gender differences in frequency of health insurance, physician visits, or ever having had spirometry were detected. In adjusted models (1) women were more likely to report COPD diagnostic delay (odds ratio [OR] 1.66, 95% confidence interval [CI] 1.13-2.45, $p=0.01$), although anxiety (OR 1.83, 95% CI 1.10-3.06, $p=0.02$) and history of exacerbations (OR 1.60, 95% CI 1.08-2.37, $p=0.01$) were also significant predictors, (2) female gender was associated with difficulty reaching one's physician (OR 2.54, 95% CI 1.33-4.86, $p=0.004$), as was prior history of exacerbations (OR 2.25, 95% CI 1.21-4.20, $p=0.01$), and (3) female gender (OR 2.15, 95% CI 1.10-4.21, $p=0.02$) was the only significant predictor for finding time spent with their physician as insufficient.

Conclusions: Significant gender-related differences in the perception of COPD healthcare delivery exist, revealing an opportunity to better understand what influences these attitudes and to improve care for both men and women.

Introduction

CHRONIC OBSTRUCTIVE PULMONARY DISEASE (COPD) is the third leading cause of death in the United States.¹ The burden of COPD among women continues to grow; the number of women dying from COPD in the United States now exceeds that of men.² Information about gender differences in clinical presentation and disease biology is accumulating, demonstrating that women tend to report more dyspnea and poorer quality of life (QOL) for the same burden of disease and also may be more susceptible to declines in lung function for the same levels of tobacco exposure.³⁻⁶ Unfortunately, knowledge about gender differences in coping with this chronic illness and interface with the healthcare delivery system is more limited.

Data from female COPD participants in pulmonary rehabilitation suggest that men and women use different types of coping strategies to deal with the demands of their disease.⁷ As compared to men, women frequently use an emotion-focused coping strategy, a response characterized by such emotions as anxiety and depression. Anxiety and depression have been reported with greater frequency among women with COPD as compared to men.³ Emotional health is a well-established determinant of the experience of patients with the healthcare system^{8,9} and is associated with healthcare services use.¹⁰ It is unknown, however, the extent to which gender itself when adjusted for such factors as depression and anxiety influences patient perceptions about care delivery.

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Using data from a nationwide survey of patients with COPD, commissioned by a patient organization, the COPD Resource Network–National Emphysema/COPD Association (NECA), we evaluated potential gender differences in symptoms, barriers to care, and sources of information about the disease and the effect of socioeconomic and emotional factors on patient perceptions of care.

Materials and Methods

The current analyses are based on the results of a national survey of patients with COPD conducted in 2007–2008.

Patient survey

The methods of the NECA-commissioned nationwide surveys of COPD patients have been published previously.¹¹ Briefly, a convenience sample of patients was assembled based on COPD participants randomly selected from one of several sources: (1) a national sample of households in which at least one person reported a diagnosis of COPD based on a database maintained by Integrated Business Services Inc. (Lake Forest, IL), (2) participants of patient support groups affiliated with the American Lung Association's Better Breathers Clubs or NECA, (3) COPD patients receiving oxygen through a national provider (Apria Healthcare, Lake Forest, CA), and (4) respondents to internet survey invitation on COPD-related websites.

Participants were mailed a 7-page questionnaire, accompanied by an explanatory letter and a postage prepaid return envelope. As incentive for participation, a summary of the executive results of the surveys was offered. The total number of completed surveys was 1,077 of 15,000 surveys sent (response rate 7.2%). As the psychologic needs of asthma patients and the effect on gender-related patterns of healthcare utilization have been studied and are better characterized than in the COPD population,^{12,13} for purposes of the current analyses, persons who reported a diagnosis of asthma or co-existent asthma and COPD were excluded, leaving 568 patients with COPD for analysis. The questionnaire was prepared with the help of COPD expert panels, including physicians, patients, and representatives of COPD organizations. The items were considered to have face validity and to be easy to understand. Questions included demographics; comorbid conditions; perceived health and limitations for daily activities; use of healthcare resources, including visits to physicians and ancillary tests and therapies; and sources of information about the disease.

Age was calculated based on reported year of birth; gender and racial designation were selected by the respondent. Annual household income was selected from a list of seven options ranging from under \$20,000 to over \$150,000, with responses recoded pooling the answers in two groups below \$30,000 and above \$30,000. Frequency of symptoms was based on the answer to the question: Has there been any 3-month period during the past year when you had the following symptoms every day or most days a week? Comorbid conditions were self-reported based on a list of conditions presented after the question: Which of the following conditions, if any, have you ever been diagnosed with? The impact of disease on a patient's life was evaluated with multiple choice questions, including: How would you describe your overall health status at the moment?—with response options

from excellent to very poor—and: How severe are your current COPD symptoms?—with response options in a Likert scale from no symptoms to very severe, which were dichotomized for purposes of the current analysis. The Medical Research Council (MRC) Dyspnea Index was used to describe severity of breathlessness. The impact of COPD on work capacity was evaluated with the answers to the questions: Does your lung condition keep you from working? Does your lung condition limit the amount or type of work you can do?

The patient's experience with the healthcare system was evaluated through a series of questions about insurance status, healthcare use, medical specialty of their provider, and frequency of diagnostic tests. The frequency of visits to any doctor and to a pulmonologist during the prior 12 months was also evaluated. Compliance with oxygen and COPD-related medications was self-reported. The patient had the opportunity to describe if he or she has participated in a pulmonary rehabilitation program and if to the best of his or her knowledge, rehabilitation programs were available or if he or she was not aware of this program. Sources of information on COPD were selected from a list of options presented. QOL was evaluated with the Living with COPD (LCOPD) questionnaire.¹⁴ (Supplemental material available online at www.liebertonline.com).

Statistical analysis

Data are presented as proportions and means, with standard deviations (SDs) as appropriate. Statistical comparisons across gender for categorical data were made using chi-square tests. Continuous data were compared with *t* tests. We tested the independent effect of female gender on perceptions of healthcare using logistic regression models. Other variables included and tested in the model were selected based on the patient factors included in the Theoretical Model of Access to Healthcare.¹⁵ The variables included in the analyses include factors related to emotional health (reported anxiety and depression), severity of disease (history of exacerbations and use of oxygen), socioeconomic status (based on annual income), and age. All *p* values were two-tailed, with a *p* value < 0.05 considered statistically significant. Analyses were performed using SAS 9.2 (SAS Institute, Cary, NC).

Results

Demographics

The characteristics of the 568 patients with COPD who responded to the survey, their symptoms, comorbid conditions, and data on COPD care are shown in Table 1. Women surveyed are younger than men and also reported their symptoms started at a younger age and were diagnosed at a younger age. The annual household income for women was significantly lower than that of men, with 59.9% of women reporting annual household income < \$30,000 vs. 44.2% of men, *p* < 0.001.

Symptoms, comorbid conditions, and disease impact

Symptoms and comorbidities by gender are also reported in Table 1. Cough and phlegm in the past 3 months were reported with less frequency by women than by men. The prevalence of comorbid conditions among this sample demonstrated that arthritis, hypertension, diabetes, and stroke

TABLE 1. DEMOGRAPHIC AND CLINICAL CHARACTERISTICS OF RESPONDENTS TO 2007 NATIONAL EMPHYSEMA/COPD ASSOCIATION SURVEY WITH A DIAGNOSIS OF CHRONIC OBSTRUCTIVE PULMONARY DISEASE

Characteristic	Males with COPD n=273	Females with COPD n=295	p value
Demographics			
Mean (SD) age at time of survey (years)	73.1 (8.3)	70.1 (10.2)	<0.001
Mean (SD) age at first symptoms (years)	62.4 (12.0)	59.3 (14.3)	0.009
Mean (SD) age at diagnosis (years)	62.0 (10.1)	59.4 (12.7)	0.009
Annual income <\$30,000 (%)	44.2	59.9	<0.001
Self-described as white (%)	96.0	96.6	0.84
Education beyond high school (%)	63.2	52.2	0.01
Symptom frequency (%)			
Shortness of breath	85.0	85.1	0.97
Cough	56.8	51.2	0.18
Phlegm	61.9	47.1	<0.001
Any nocturnal symptom	29.3	30.5	0.75
Comorbid diseases (%)			
Heart disease	32.0	21.4	0.004
Anxiety	12.9	24.4	<0.001
Depression	15.8	24.1	0.01
Obesity	9.9	17.0	0.01
Osteoporosis	7.0	36.3	<0.001
Arthritis	33.5	40.3	0.09
Diabetes	21.0	17.0	0.22
Hypertension	45.2	46.8	0.71
Migraine	1.5	5.4	0.01
Sleep disorder	16.2	16.6	0.88
Self-rated health and limitations (%)			
Self-rated poor or very poor health	22.0	18.6	0.31
Severe or very severe symptoms	40.7	33.1	0.07
Severe dyspnea (MRC dyspnea score 3–4)	26.5	24.6	0.60
Symptoms keep me from work	30.4	25.8	0.21
Symptoms limit amount of work	51.7	44.1	0.07
Mean score LCOPD questionnaire	9.9 (6.1)	9.7 (6.0)	0.81
Exacerbations last year (%)			
At least one with hospital admission	28.6	26.1	0.51
At least one with emergency room visit	24.5	26.4	0.60
COPD management and medications (%)			
Ever had spirometry	97.4	96.6	0.56
Oxygen use	62.8	61.8	0.80
Continuous oral steroids	18.4	14.1	0.15
Steroids during exacerbations	25.3	34.4	0.02
Use oxygen as much as prescribed	78.4	83.8	0.20
Very compliant with medications	85.1	84.7	0.89
Very persistent with medications	95.5	94.1	0.45
Has ever stopped COPD medications	23.8	25.3	0.68
Prefers dry-powdered inhalers	62.3	54.6	0.06
Prefers metered dose inhalers	57.5	54.2	0.48
Believes medications are effective	91.2	90.6	0.46

COPD, chronic obstructive pulmonary disease; LCOPD, Living with COPD; MRC, Medical Research Council; SD, standard deviation.

were reported with similar frequency by both women and men, but heart disease was reported with less frequency by women. More women than men, however, reported obesity, osteoporosis, anxiety, and depression. A similar proportion of women and men had at least one hospital admission secondary to COPD during the prior year and at least one visit to the emergency room secondary to a COPD exacerbation. In general, women reported that COPD had a similar impact on their daily lives as it had to men. Severe breathlessness, according to the MRC Dyspnea Questionnaire, was described with similar frequency by women and men. Women and men

reported with similar frequency that their disease limited the amount of time they could work, as well as kept them from working.

COPD management

Almost all respondents recalled spirometry testing at some point during the course of their disease, and almost two thirds of participants had been prescribed oxygen. Oxygen compliance between genders was similar. Although more women than men reported having received steroids for an

TABLE 2. HEALTHCARE EXPERIENCE, PERCEPTIONS ON HEALTHCARE, AND EXPECTATIONS OF RESPONDENTS TO THE 2007 NATIONAL EMPHYSEMA/COPD ASSOCIATION SURVEY WITH A DIAGNOSIS OF CHRONIC OBSTRUCTIVE PULMONARY DISEASE

	<i>Males with COPD n=273</i>	<i>Females with COPD n=295</i>	<i>p value</i>
Provider managing COPD (%)			
Pulmonologist	54.3	53.8	0.84
Primary care provider/internist	43.2	41.1	0.59
Other providers involved (%)			
Cardiologist	46.0	29.2	<0.001
Otolaryngologist	9.6	7.2	0.32
Endocrinologist	6.5	6.1	0.85
Psychiatrist	4.6	4.0	0.72
Total number of providers, mean (SD)	1.8 (1.1)	1.6 (1.2)	0.03
Insurance (%)			
Medicare	77.3	71.4	0.11
Through employer/work	35.2	28.6	0.09
Lacks insurance	1.5	1.4	0.92
Medicaid	6.2	9.9	0.11
Visits to physicians prior 12 months			
Any physician, mean (SD)	7.7 (6.3)	6.8 (5.2)	0.06
Pulmonologist, mean (SD)	2.8 (3.0)	2.9 (3.6)	0.72
Experience with rehabilitation (%)			
Have participated in rehabilitation	48.0	40.5	0.07
Not aware of rehabilitation programs	25.3	31.3	0.11
Pulmonary rehabilitation is not available	13.0	18.7	0.07
Uncertain rehabilitation is helpful	17.6	13.3	0.15
Does not believe rehabilitation works	3.7	2.7	0.51
Perception about healthcare (%)			
Believes diagnosis was delayed	26.7	36.3	0.02
Doctor is difficult to reach	5.8	14.2	<0.001
Doctor sympathetic to condition	90.4	83.4	0.01
Feels treated poorly as smoker	10.5	13.2	0.34
Not enough time with my physician	5.7	12.4	0.006
Very satisfied with my physician	58.2	63.0	0.24
Insurance is a barrier for at least one aspect of care	16.8	24.5	0.03
Insurance is a barrier for obtaining prescription medication	2.6	5.4	0.83
Insurance is a barrier for rehabilitation	7.0	5.8	0.56
Insurance is a barrier for antibiotics	1.1	3.4	0.06
Insurance barrier for medications to control symptoms	6.2	9.9	0.11
Knowledge about COPD			
Aware of guidelines	44.7	46.3	0.70
Very well/adequately informed	89	82.7	0.03
Source of education/information (%)			
Physician	89.8	81.3	0.004
Respiratory therapist	48.7	42.2	0.11
Nurse	36.6	29.6	0.07
Books, magazines	33.7	34.4	0.87
Other patients	12.5	19.1	0.03
Television or cable	12.8	11.6	0.64
Patient organizations	12.1	14.3	0.44
Online support groups	13.6	20.4	0.03
Other internet resources	22.7	25.9	0.38
Important activities to promote (%)			
Access to treatment	64.6	77.0	0.001
Development of new therapies	55.2	77.7	<0.001
Clinical research	44.5	60.7	<0.001
Educational materials	33.7	47.5	<0.001
Public awareness	33.9	56.3	<0.001
Screening	40.9	61.8	<0.001
Pulmonary rehabilitation	56.3	67.2	0.006
Research funding	50.5	60.3	0.02
Education of physicians	48.3	65.1	<0.001

exacerbation during the last 12 months, no difference in continuous oral steroid use was reported.

Healthcare and pulmonary rehabilitation experience

Data on the respondents' healthcare experience, participation in rehabilitation, and disease education are summarized in Table 2. For women and men surveyed, the healthcare provider managing his or her COPD was more frequently a pulmonologist, and internists or primary care physicians came in second. When asked about other physicians involved in their care, women had contact with cardiologists with lower frequency, but no gender differences in the frequency of visiting a psychiatrist were seen. For both women and men, the most frequent health insurer was Medicare, and almost one third of subjects reported having insurance through their employer. Lack of insurance coverage was similar between men and women. Women and men reported pulmonary rehabilitation program participation with similar frequency. A similar, but significant, proportion of women and men were unaware of the existence of rehabilitation programs, and lack of access to a program in their area was also similar between women and men.

Sources of information on COPD

For women, sources of information about COPD differed significantly from those of men. Women reported less receipt of education from their physician but were more likely than men to obtain information from other patients and online support groups. However, slightly fewer women than men believed they were very well or adequately informed about their health condition (Table 2).

Differences and factors related to perceptions of healthcare

Women reported with greater frequency the belief that they experienced a delay in their diagnosis, believed their physicians were more difficult to reach when they needed care, and felt that the time spent with their doctor was insufficient. However, overall satisfaction with their physician's disease management was similar for men and women. Although the frequency and distribution of health insurance was no different between women and men, with the proportion of uninsured women and men being similar in this cohort, more women than men described their insurance as a barrier for at least one component of the healthcare process. No significant difference was seen in the percent of women vs. men who believed that their insurance was a barrier to accessing antibiotics or symptom-relieving medications.

In order to understand the impact of potential confounders, multivariate models were constructed to determine if gender differences in perceptions of care still existed when adjusted for factors associated with income, disease severity (exacerbation history and oxygen use), and history of anxiety and depression. In adjusted models, women were still more likely to report a diagnostic delay (odds ratio [OR] 1.66, 95% confidence interval [CI] 1.13-2.45, $p=0.01$), although anxiety (OR 1.83, 95% CI 1.10-3.06, $p=0.02$) and history of prior exacerbation in the last year (OR 1.60, 95% CI 1.08-2.37, $p=0.01$) were also significant predictors. In adjusted models, female gender was also still associated with finding one's physician difficult to reach (OR 2.54, 95% CI 1.33-4.86, $p=0.004$), as was prior history of exacerbations (OR 2.25, 95% CI 1.21-4.20, $p=0.01$), whereas other predictors were nonsignificant. In adjusted models predicting whether time spent with one's doctor was insufficient, female gender (OR 2.15, 95% CI 1.10-4.21, $p=0.02$) was the only significant predictor. Interestingly, in modeling the belief that insurance is a barrier to at least one area of one's care, female gender becomes nonsignificant; low income, however, is the only significant predictor (OR 1.77, 95% CI 1.12-2.77, $p=0.01$) (Table 3).

Discussion

With the growing burden of COPD among women, understanding gender differences in disease presentation and access to care becomes critically important. Our results extend previous findings that women with COPD report lower frequency of cough and sputum production⁴ and experience greater frequency of depression and anxiety,¹⁶⁻¹⁸ osteoporosis,¹⁹ and obesity.²⁰ At the same time, our data provide new findings regarding gender differences in patient perceptions and expectations of the healthcare system. Despite reporting similar access to healthcare insurance, physicians, and pulmonary rehabilitation, more women than men reported insurance as a barrier to at least one aspect of their care. More women also believed they had experienced a diagnostic delay of their COPD, reported difficulties in reaching their physician, and believed the time with their treating physician to be insufficient. As the potential sources of disease education for patients with COPD are rapidly expanding, women obtained information about their disease from online support groups, and fewer obtained disease information from their physician as compared to men.

Some of the most interesting findings of our study relate to perceptions that women with COPD have about their interactions with the healthcare system. More women reported

TABLE 3. MULTIVARIATE ANALYSIS OF FACTORS RELATED TO PERCEPTIONS ON HEALTHCARE EXPERIENCE OF RESPONDENTS TO THE 2007 NATIONAL EMPHYSEMA/COPD ASSOCIATION SURVEY WITH A DIAGNOSIS OF CHRONIC OBSTRUCTIVE PULMONARY DISEASE

	Female gender ^a	Anxiety	Exacerbations	Low income
Diagnosis was delayed	1.66 (1.13-2.45), 0.01	1.83 (1.10-3.06), 0.02	1.60 (1.08-2.37), 0.01	NS
Doctor difficult to reach	2.54 (1.33-4.86), 0.004	NS	2.25 (1.20-4.20), 0.01	NS
Insufficient time with doctor	2.15 (1.10-4.21), 0.02	NS	NS	NS
Insurance is a barrier	NS	NS	NS	1.76 (1.12-2.77), 0.01

Multivariate models additionally adjusted for depression and use of oxygen.

^aFor all predictors, odds ratio (95% confidence interval), p -value.

NS, nonsignificant.

that their insurance was a barrier to receiving at least one aspect of their care. However, no discernible difference in the percentage of patients insured or frequency of visits to physicians was detected. As the annual household income for women in this survey was less than that for men, it is possible that the impact of out-of-pocket expenses could lead to greater barriers for healthcare access for women. Supportive of this possibility, in multivariate models adjusted for annual income, income itself but not gender was the only significant predictor of perceiving insurance as a barrier to care.

Women also reported greater difficulty reaching their doctor. In adjusted models, female gender and history of prior exacerbations were significant predictors of the perception that one's physician is difficult to reach. Clinical trials designed to evaluate different COPD interventions suggest that exacerbations may occur with higher frequency in women^{21,22}; therefore it is possible that women are expressing more frustration as they have greater need to be seen quickly for exacerbations, for which the healthcare system may not be well adapted.

In unadjusted and adjusted models, female gender was the only explanatory variable associated with the perception that the time spent with the physician was insufficient. Fewer women also believed their doctor was sympathetic to their condition. Why women describe a poorer experience with these aspects of the healthcare system is unclear. One prior study of COPD patients revealed no significant gender differences in patient satisfaction with their care.²³ This prior study, however, was an international survey, which may contribute to a difference in findings. It is possible that the actual amount of time each physician spends with women is less than it is for men or that women have greater need for time with their physicians. Another possible explanation for this finding may be gender discordance between male physicians and female patients. Studies in a variety of medical settings have shown that physician-patient discordance on a number of social characteristics, including gender, is associated with a less positive perception of care.^{24,25}

Our data demonstrate that women perceive a greater delay in diagnosis, even when they were on average younger in age compared to male participants when they received their diagnosis. Female gender was still associated with the perception of diagnostic delay when adjusted for relevant confounders, such as socioeconomic status, disease severity, and history of anxiety and depression. There is growing evidence on gender differences in quality and extent of care with other chronic conditions,²⁶⁻²⁸ but specific data on COPD are limited. Self-reported delay in care for women with diabetes and cardiovascular disease has been published, with differences maintained in both insured and uninsured patients.²⁸ In the respiratory community, there has been suspicion that women with COPD could be underdiagnosed, based on results of two studies demonstrating that given similar clinical scenarios, physicians are more likely to make a diagnosis of COPD in male vs. female subjects.^{29,30} Our data provide, for the first time, evidence that women with COPD actually perceive a delay in diagnosis. Whether these data represent a difference in the propensity to self-identify a need of care or an actual gender-related difficulty in obtaining the care is unclear and will need to be evaluated in further prospective evaluations.

Women surveyed also reported higher frequency of anxiety, depression, osteoporosis, and obesity than men but lower

frequency of heart disease. It is unknown to what extent these data are influenced by physician bias or differences in the healthcare received. Interestingly, although 32.0% of men and 21.4% of women in this study reported a history of heart disease, 46.0% of men but only 29.2% of women had a cardiologist involved in their care. It has been reported that women are less likely to receive referrals to specialists.³¹ With respect to other aspects of their care, male and female participants surveyed here received their COPD-related care from pulmonologists, internists, and other primary care practitioners with similar frequency, and the mean number of additional physicians involved in the patient's care was higher for women than for men in this survey. At a minimum, these data highlight the need for physicians to be aware that cardiovascular disease is common in both men and women with COPD and must be considered in diagnostic and therapeutic decision making.

Disease education is critically important, as a relationship between the level of a patient's health literacy and health outcomes in chronic diseases has been documented.³² Education and information are even more critical for management of chronic and multidimensional diseases, such as COPD, where it has been shown that basic therapeutic interventions, such as the use of inhalers, can be a challenge for patients.³³ We inquired about sources for medical information for COPD patients and found that women were less likely than men to obtain knowledge about their disease from their physician and more likely to rely on other patients and online support groups. These data underscore the importance of good communication skills for healthcare providers, particularly for female patients, and suggest that women need to engage with other patients as part of their coping strategy for living with a chronic illness. Data from other chronic diseases suggest that women are more likely to report the use of coping strategies and find these strategies effective.³⁴ Although almost one quarter of the respondents used other internet resources for information, the overall proportion of respondents using the internet for disease education is low compared with the numbers in other surveys.³⁵ This is likely due to the elderly nature of the surveyed population, as those seeking medical information on the internet tend to be younger.³⁵ As access to the internet increases, particularly for elderly patients with limited mobility, another opportunity for education and outreach will be available that may be particularly valuable to women with COPD and should be encouraged.

One limitation of this study is that it relies on self-response, with no validation of responses on use of medical services, comorbid conditions, and barriers to use of medical services, including delay in healthcare. However, similar methodology and questionnaire content have been used in previous surveys targeting a similar population.^{11,36} It is difficult to know with certainty if systematic biases exist between men and women with respect to survey data participation and response, but current evidence does not support this suspicion.³⁷ Another potential limitation of these data is the lack of information on pulmonary function or disease severity descriptors. An additional limitation is that this is a convenience sample with a low response rate (7.2%) and may not be representative of the general patient population. The high self-reported frequency of oxygen use suggests that the severity of disease in this cohort is high, and results may not be generalizable to the less severe COPD patients.

Conclusions

In this analysis of a national survey of COPD patients, significant differences between men and women were found, especially in access to and receipt of care and health information. Despite apparently similar access to healthcare insurance, physician visits, and pulmonary rehabilitation, women were more likely than men to report inadequacies in the quality of the care received for their COPD, including perception of COPD diagnostic delay, insufficient time spent with their doctor, and difficulty reaching their doctor, even after adjustment for income, disease severity, and indicators of mental health. This information highlights the need for further research to identify the factors influencing these attitudes and coping strategies and design interventions to improve care for both men and women with COPD.

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Disclosure Statement

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F.J.M. has consulted for or participated in Advisory Boards in COPD development for Actelion, Almirall, American Institutes for Research, Astra Zeneca, Bayer, BoomComm, Cardiomems, Forest, GSK, HCRC, Ikaria, JK Associates, MedImmune, Merck, Novartis, Nycomed/Takeda, Pearl, Pfizer, Schering, and Sudler and Hennessey. He has been a member of the Steering Committee for COPD studies sponsored by Actelion, GSK, Forest, MPex, and Nycomed and has participated in FDA Mock panels for Boehringer Ingelheim and Forest. The University of Michigan received funds from Boehringer Ingelheim for a COPD study. F.J.M. has served on Speaker's Bureaus or in CME activities sponsored by ACCP, American Lung Association, Almirall, Astra Zeneca, Beaumont, Boehringer Ingelheim, Center for Health Care Education, CME Incite, ePocrates, Forest, France Foundation, GSK, Lovelace, MedEd, NACE, Nycomed, Potomac, Prescott, Sanofi Aventis, St. Luke's, UpToDate, the University of Virginia, and William Beaumont Hospital. He has received royalties from Associates in Medical Marketing and Castle Connolly.

M.K.H. in the past 3 years has participated in advisory boards for Boehringer Ingelheim GmbH, Pfizer, GlaxoSmithKline, Genentech, Novartis, and MedImmune. She has participated on speaker's bureaus for Boehringer Ingelheim GmbH, Pfizer, GlaxoSmithKline, the National Association for Continuing Education, and WebMD. She has consulted for Novartis and Nycomed and has received royalties from UpToDate and ePocrates, Inc.

References

1. Minino A, Xu J, Kochanek K. Deaths: Preliminary data for 2008. National Vital Statistics Reports. Hyattsville, MD: National Center for Health Statistics, 2010;59(2). Available at cdc.gov/nchs/data/nvsr/nvsr59/nvsr59_02.pdf. Accessed August 29, 2011.
2. Deaths from chronic obstructive pulmonary disease—United States, 2000–2005. *MMWR* 2008;57:1229–1232.
3. Han MK, Postma D, Mannino DM, et al. Gender and chronic obstructive pulmonary disease: Why it matters. *Am J Respir Crit Care Med* 2007;176:1179–1184.
4. Camp PG, O'Donnell DE, Postma DS. Chronic obstructive pulmonary disease in men and women: Myths and reality. *Proc Am Thorac Soc* 2009;6:535–538.
5. Camp PG, Goring SM. Gender and the diagnosis, management, and surveillance of chronic obstructive pulmonary disease. *Proc Am Thorac Soc* 2007;4:686–691.
6. Sin DD, Cohen SB, Day A, Coxson H, Pare PD. Understanding the biological differences in susceptibility to chronic obstructive pulmonary disease between men and women. *Proc Am Thorac Soc* 2007;4:671–674.
7. Ninot G, Fortes M, Poulain M, et al. Gender difference in coping strategies among patients enrolled in an inpatient rehabilitation program. *Heart Lung* 2006;35:130–136.
8. Rauch SA, Favorite T, Giardino N, Porcari C, Defever E, Liberzon I. Relationship between anxiety, depression, and health satisfaction among veterans with PTSD. *J Affect Disord* 2010;121:165–168.
9. Wikehult B, Ekselius L, Gerdin B, Willebrand M. Prediction of patient satisfaction with care one year after burn. *Burns* 2009;35:194–200.
10. Philipson S, Wakefield CE, Kasparian NA. Women's knowledge, beliefs, and information needs in relation to the risks and benefits associated with use of the oral contraceptive pill. *J Womens Health* 2011;20:635–642.
11. Barr RG, Celli BR, Martinez FJ, et al. Physician and patient perceptions in COPD: The COPD Resource Network Needs Assessment Survey. *Am J Med* 2005;118:1415.
12. Baibergerova A, Thabane L, Akhtar-Danesh N, Levine M, Gafni A. Patient characteristics associated with nocturnal emergency department visits for asthma. *J Asthma* 2006;43:469–475.
13. Heaney LG, Conway E, Kelly C, Gamble J. Prevalence of psychiatric morbidity in a difficult asthma population: Relationship to asthma outcome. *Respir Med* 2005;99:1152–1159.
14. McKenna SP, Meads DM, Doward LC, et al. Development and validation of the Living with Chronic Obstructive Pulmonary Disease questionnaire. *Qual Life Res* 2011;20:1043–1052.
15. Khan AA, Bhardwaj SM. Access to health care. A conceptual framework and its relevance to health care planning. *Eval Health Prof* 1994;17:60–76.
16. Di Marco F, Verga M, Reggente M, et al. Anxiety and depression in COPD patients: The roles of gender and disease severity. *Respir Med* 2006;100:1767–1774.
17. Maurer J, Rebbapragada V, Borson S, et al. Anxiety and depression in COPD: Current understanding, unanswered questions, and research needs. *Chest* 2008;134:43S–56S.
18. Hanania NA, Mullerova H, Locantore NW, et al. Determinants of depression in the ECLIPSE chronic obstructive pulmonary disease cohort. *Am J Respir Crit Care Med* 2011;183:604–611.
19. Almagro P, Lopez Garcia F, Cabrera F, et al. Comorbidity and gender-related differences in patients hospitalized for COPD. The ECCO study. *Respir Med* 2010;104:253–259.
20. Schokker DF, Visscher TL, Nooyens AC, van Baak MA, Seidell JC. Prevalence of overweight and obesity in the Netherlands. *Obes Rev* 2007;8:101–108.

21. Celli B, Vestbo J, Jenkins CR, et al. Sex differences in mortality and clinical expressions of patients with chronic obstructive pulmonary disease: The TORCH experience. *Am J Respir Crit Care Med* 2011;183:317–322.
22. Tashkin D, Celli B, Kesten S, Lystig T, Decramer M. Effect of tiotropium in men and women with COPD: Results of the 4-year UPLIFT trial. *Respir Med* 2010;104:1495–1504.
23. Watson L, Vestbo J, Postma DS, et al. Gender differences in the management and experience of chronic obstructive pulmonary disease. *Respir Med* 2004;98:1207–1213.
24. Thornton RL, Powe NR, Roter D, Cooper LA. Patient-physician social concordance, medical visit communication and patients' perceptions of health care quality. *Patient Educ Couns* 2011; 85:e201–e208.
25. Derose KP, Hays RD, McCaffrey DF, Baker DW. Does physician gender affect satisfaction of men and women visiting the emergency department? *J Gen Intern Med* 2001;16:218–226.
26. Chou AF, Brown AF, Jensen RE, Shih S, Pawlson G, Scholle SH. Gender and racial disparities in the management of diabetes mellitus among Medicare patients. *Womens Health Issues* 2007;17:150–161.
27. Owens GM. Gender differences in health care expenditures, resource utilization, and quality of care. *J Manag Care Pharm* 2008;14:2–6.
28. Ng JH, Kaftarian SJ, Tilson WM, et al. Self-reported delays in receipt of health care among women with diabetes and cardiovascular conditions. *Womens Health Issues* 2010;20:316–322.
29. Chapman KR, Tashkin DP, Pye DJ. Gender bias in the diagnosis of COPD. *Chest* 2001;119:1691–1695.
30. Miravittles M, de la Roza C, Naberan K, et al. [Attitudes toward the diagnosis of chronic obstructive pulmonary disease in primary care.] *Arch Bronconeumol* 2006;42:3–8.
31. Franks P, Clancy CM, Naumburg EH. Sex, access, and excess. *Ann Intern Med* 1995;123:548–550.
32. Chen AM, Yehle KS, Plake KS, Murawski MM, Mason HL. Health literacy and self-care of patients with heart failure. *J Cardiovasc Nurs* 2011;26:446–451.
33. Press VG, Arora VM, Shah LM, et al. Misuse of respiratory inhalers in hospitalized patients with asthma or COPD. *J Gen Intern Med* 2011;26:635–642.
34. Harwood L, Wilson B, Sontrop J. Sociodemographic differences in stressful experience and coping amongst adults with chronic kidney disease. *J Adv Nurs* 2011;67:1779–1789.
35. Koch-Weser S, Bradshaw YS, Gualtieri L, Gallagher SS. The Internet as a health information source: Findings from the 2007 Health Information National Trends Survey and implications for health communication. *J Health Commun* 2010;15 (Suppl 3):279–293.
36. Barr RG, Celli BR, Mannino DM, et al. Comorbidities, patient knowledge, and disease management in a national sample of patients with COPD. *Am J Med* 2009;122:348–355.
37. Kjoller M, Thoning H. Characteristics of non-response in the Danish Health Interview Surveys, 1987–1994. *Eur J Public Health* 2005;15:528–535.

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