

Factors affecting health status in COPD patients with co-morbid anxiety or depression

Minna J Hynninen¹
Ståle Pallesen²
Inger Hilde Nordhus¹

¹Department of Clinical Psychology,
University of Bergen, Norway

²Department of Psychosocial Science,
University of Bergen, Norway

Abstract: Health status questionnaires provide standardized measures of patients' perceptions of the impact of disease on their daily life and well-being. Factors associated with health status were examined in a sample of 58 outpatients with chronic obstructive pulmonary disease (COPD) and co-morbid anxiety and/or depression. A cross-sectional descriptive study was conducted with the following measures: The St. George's Respiratory Questionnaire (SGRQ); the Beck Anxiety Inventory (BAI); the Beck Depression Inventory, 2nd edition (BDI); the Pittsburgh Sleep Quality Index (PSQI); and spirometry. Disease severity as measured with spirometry was not related to health status. Perceptions of poor health as implied by the health status scores were positively associated with symptoms of anxiety and depression, sleep disturbances, and level of daily functioning. There were statistically significant differences between men and women on COPD severity, age, and the BAI scores. The findings emphasize the importance of screening the patients at all stages of disease severity for anxiety, depression, and sleeping problems, in order to provide adequate care for these problems.

Keywords: COPD, health status, health-related quality of life, anxiety, depression, sleep

Chronic obstructive pulmonary disease (COPD) is a highly incapacitating health problem, which not only affects physical functioning, but also leisure and professional activities as well as emotional and sexual relationships (Godoy and Godoy 2003). COPD and associated symptoms, such as fatigue and dyspnoea, cause restrictions on patients' exercise tolerance, consequently having a major impact on their ability to carry out daily activities, frequently resulting in reduced quality of life (Jones 2006).

Because the airflow obstruction in COPD is largely irreversible, interventions for managing the disease are primarily aimed at improving patients' health-related quality of life (Cully et al 2006). As quality of life may be difficult to measure with a standardized questionnaire, illness-specific health status questionnaires, such as St. George's Respiratory Questionnaire (SGRQ) (Jones et al 1992) and Chronic Respiratory Questionnaire (CRQ) (Guyatt et al 1987), provide means of quantifying the patients' perceptions of the general effects of COPD on their daily life and well-being (Jones 2001, 2006). Physiological parameters have been shown to correlate with health status (Ståhl et al 2005), but in some studies the associations have been weak (Jones 2001; McCathie et al 2002), and even patients with mild disease have reported substantially impaired health status (Ferrer et al 1997). The impact that COPD has on individuals living with the disease is likely to depend on multiple factors in addition to the medical burden, ranging from the patient's life circumstances and expectations to coping skills and psychological well-being.

Previous research has shown that there is a high prevalence of anxiety and depression among COPD patients, and psychological distress has a profound impact on how persons with COPD experience and manage their disease (Hynninen et al 2005).

Correspondence: Minna J Hynninen
Department of Clinical Psychology,
Christiesgate 12, N-5015 Bergen, Norway
Tel +47 55 58 88 96
Fax +47 55 58 98 77
Email minna.hynninen@student.uib.no

Psychological distress, as indicated by symptoms of anxiety and depression, has been reported to account for a significant amount of variance in health status in patients with moderate and severe COPD (Hajiro et al 2000; Gudmundsson et al 2006) as well as in hospitalized patients with acute exacerbations (Andenæs et al 2004). Despite the frequency of anxiety and depression in COPD patients, only one previous study has focused on health status in patients with clinically significant levels of co-morbid depression and/or anxiety. Using a sample of veterans with COPD, Cully, Graham et al (2006) found that mental health symptoms, and in particular symptoms of anxiety, were the most salient factors associated with health status outcomes, above and beyond COPD severity, medical co-morbidity, and demographic factors. However, participants in this study were primarily males, which limits the generalizability of the results.

In addition to being symptomatic of both anxiety and depression, disturbed sleep is also common in COPD. Sleep disturbance has been found to be the third most common symptom associated with COPD (Kinsman et al 1983), and studies have revealed that low total sleep time, frequent arousals and awakenings, and reduced amounts of slow-wave and rapid eye movement sleep seem to characterize the sleep of COPD-patients (Ballard 2005). Sleep disturbance in patients with severe COPD may be related to symptoms, such as nocturnal cough, wheezing, and dyspnoea, as a consequence of impaired pulmonary functions and gas exchange during sleep (Mohsenin 2005). Psychological distress may, however, contribute to sleep difficulties in all stages of disease severity, and both anxiety and depression have been shown to have a negative effect on the sleep quality in COPD (Bellia et al 2003; Kapella et al 2006). Sleep impairment not only worsens quality of life but may also aggravate symptoms of the underlying medical disorder (Ballard 2005). Thus, further investigation of the associations between sleep problems, psychological distress, and health status in COPD is needed.

The present study aimed at investigating factors associated with health status in a sample of COPD outpatients in all stages of disease severity, who additionally were suffering from symptoms of anxiety and/or depression. Because sleep problems may intensify the effects of a medical illness, difficulties with sleep were expected to be associated with health status impairment. Since psychological distress seems to play an important role in how patients experience their disease, it was also hypothesized that perceived health status would be more strongly related to psychological distress than to the severity of COPD. Furthermore, as women tend

to have higher levels of psychological distress, females were expected to show more health status impairment regardless of their COPD severity.

Method

The study was conducted with a subsample of 58 patients recruited to participate in a randomized, controlled trial of cognitive behavioral therapy in persons with COPD and co-morbid anxiety and/or depression.

Participants

Persons with a COPD diagnosis, attending an outpatient pulmonary clinic at the Haukeland University Hospital, Bergen, Norway, were targeted for recruitment. In addition, participants were recruited through advertisements in a newspaper and brochures distributed to pulmonary specialists and primary care physicians. A total of 327 patients were contacted and screened by telephone with five depression and anxiety questions from the PRIME-MD patient questionnaire (Persoons et al 2003). Those who responded positively to at least one PRIME-MD anxiety or depression item and were interested in study participation were recruited for further screening and a baseline assessment (N = 78). From the 78 baseline assessments, 20 patients were excluded for following reasons: no clinically significant anxiety or depression present (Beck Anxiety Inventory >16; Beck Depression Inventory >14) (N = 13), severely depressed and/or suicidal (N = 2), active substance use disorders (N = 2), and other reasons (N = 3).

Measures

Anxiety

The 21-item Beck Anxiety Inventory (BAI) (Beck and Steer 1993) was used to assess anxiety severity. The BAI has been validated for use with older medical patients (Wetherell and Arean 1997) and the scale possesses strong psychometric properties related to internal consistency, validity, and test-retest reliability (Beck and Steer 1993). Total scores ranging from 0 to 7 are indicative of minimal anxiety, 8–15 of mild anxiety, 16–25 of moderate anxiety, and 26–63 of severe anxiety.

Depression

The Beck Depression Inventory, 2nd edition (BDI; Beck, Steer et al 1996), a 21-item self-report measure of depression, was used to assess severity of depression. The BDI possesses strong internal consistency, factorial and convergent validity, and test-retest stability (Beck et al 1996), and it has been validated for use with medical patients (Arnau et al 2001). Total scores ranging from 0 to 13 are indicative of minimal

depression, 14–19 of mild depression, 20–28 of moderate depression, and 29–63 of severe depression.

Health status

St. George's Respiratory Questionnaire (SGRQ) was used to assess perceived health status. The SGRQ was developed to measure the impact of respiratory disease on daily life, health, and well-being, and it has been shown to be reliable, valid, and responsive when used with COPD patients (Jones et al 1992). Component scores measuring symptoms (Symptoms), impacts on daily life (Impacts), disturbance to daily activities (Activity), and an overall (Total) score are normally calculated. Each component as well as the Total is scored on a scale from 0 to 100, where a score of "0" is indicating absence of problems and a score of "100" suggest the worst state possible. A change in the SGRQ score of 4 units is considered as clinically significant (Jones et al 1992).

Sleep quality

Pittsburgh Sleep Quality Index (PSQI) (Buysse et al 1989) was used to assess sleep difficulties. The PSQI is a 19-item self-rating scale designed to measure perceived quality of sleep during the preceding month. Psychometric evaluation supports its internal consistency and construct validity when used with medical patients (Beck et al 2004). In addition to a global score, PSQI provides seven component scores, comprising subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleeping medication, and daytime dysfunction. Global scores greater than 5 (total range 0–21) are considered indicative of sleep difficulty.

COPD severity

The Forced Expiratory Volume in 1 second (FEV_1) was used as a measure of COPD severity, as recommended by the Global Initiative for Chronic Obstructive Lung Disease (GOLD) guidelines (GOLD 2005). Each participant completed a spirometry, administered by trained staff at the out-patient pulmonary clinic. GOLD criteria were used to stage the disease severity; $FEV_1 \geq 80\%$ (predicted) corresponding to mild COPD, FEV_1 50–79% to moderate COPD, FEV_1 30–49% to severe COPD, and $FEV_1 \leq 29\%$ to very severe COPD, respectively.

Medical co-morbidities and hospitalizations

Medical co-morbidities and number of nights in hospital during the past two months were assessed from participant self-report. Patients were provided with a list of common and severe medical illness categories, and the total number

of other illnesses in addition to COPD was used to comprise a numeric value expressing medical co-morbidity. This assessment gave a possible score range of 0–14.

Data analysis

SPSS 14.0 statistical software (SPSS Inc, Chicago, III) was used for all data analysis. Bivariate relationships between variables were expressed by the Pearson's product-moment correlation (r). A p -value of less than 0.05 was considered to be statistically significant. Potential statistical differences between two subgroups (based upon COPD severity) of patients were calculated by t-test for independent samples.

Results

Table 1 provides an overview of participant characteristics. Thirteen (22.4%) patients had scores on the BAI indicating mild anxiety, and 25 (43.1%) had scores indicating moderate to severe anxiety. Twenty-three (39.7%) had scores on the BDI indicating mild depression, and 20 (34.5%) had scores indicating moderate to severe depression. Fifteen (25.9%) were classified as having moderate to severe symptoms of both anxiety and depression. The most common medical co-morbidities were heart disease (28%), hypertension (21%), and diabetes (12%).

Bivariate relationships

Table 2 shows the Pearson moment-product correlations for the primary study measures. Notably, FEV_1 was not significantly related to SGRQ or any of the other primary study measures. The scores of the BAI and the BDI were positively correlated with the scores of SGRQ Total, and Activity and Impact subscales. Number of nights in

Table 1 Participant characteristics

Characteristic	
Gender	Men 58.6% (n = 34), Women 41.4% (n = 24)
Mean age (SD)	62.1 (8.6)
Mean education yrs. (SD)	12.2 (3.1)
Marital status	Married 63.8% (n = 37), Divorced/separated 12.1% (n = 7), Live-in partner 10.3% (n = 6), Never married 6.9% (n = 4), Widowed 5.2% (n = 3), Unknown 1.7% (n = 1)
Mean FEV_1 % predicted (SD)	53.79 (23.96)
Smoking status	Smoker 20.7% (n = 12), Ex-smoker 74.1% (n = 43), Non-smoker 5.2% (n = 3)
Mean number of medical co-morbidities (SD)	1.7 (1.3)

Table 2 Pearson correlations for primary study measures

Measure	SGRQ Total	SGRQ Symptoms	SGRQ Activity	SGRQ Impact	FEV ₁	BAI	BDI
FEV ₁	-0.158	-0.031	-0.228	-0.106			
BAI	0.339**	0.107	0.288*	0.357**	0.100		
BDI	0.360**	0.086	0.281*	0.397**	0.117	0.584***	
Age	-0.011	0.121	-0.063	-0.032	-0.50	-0.341**	-0.358**
Hospitalizations	0.408**	0.297*	0.241	0.419**	-0.227	0.206	-0.025
Medical Co-morbidities	0.100	-0.108	0.142	0.127	0.128	0.253	0.165
PSQI Sleep quality	0.093	0.179	-0.127	0.161	0.208	0.118	0.132
PSQI Sleep latency	-0.063	-0.014	-0.274*	0.064	0.178	-0.032	0.092
PSQI Sleep duration	0.058	-0.014	0.063	0.063	0.051	-0.080	-0.009
PSQI Sleep efficiency	-0.055	-0.111	-0.047	-0.017	0.167	-0.027	-0.084
PSQI Sleep disturbances	0.404**	0.378**	0.189	0.409**	0.208	0.228	0.245
PSQI sleep medication	0.119	0.161	0.053	0.099	0.160	0.174	0.104
PSQI Daytime functioning	0.570***	0.374**	0.364**	0.576***	-0.043	0.251	0.197
PSQI Total	0.154	0.136	-0.017	0.211	0.231	0.116	0.102

SGRQ: St. George's Respiratory Questionnaire; FEV₁: Forced expiratory volume in 1 second; BAI: Beck Anxiety Inventory; BDI: Beck Depression Inventory, 2nd edition; Hospitalizations: Number of nights in hospital during the last two months; Co-morbidities: Number of other medical co-morbidities; PSQI: Pittsburgh Sleep Quality Index. On the SGRQ, BAI, BDI and PSQI, higher scores mean greater impairment.

* $p \leq 0.05$, ** $p \leq 0.01$, *** $p \leq 0.001$

hospital during the past two months was significantly correlated with the scores of SGRQ total, and Symptoms and Impact subscales. The scores of the PSQI component Daytime Functioning showed strong correlations with the scores of the SGRQ Total and all three subscales, whereas the scores of the Sleep Disturbance component was positively correlated with the scores of the SGRQ Total and Symptoms and Impact subscales.

Health status and psychological distress in relation to COPD severity

The mean total score on the SGRQ was 55.3, suggesting perceptions of overall poor health among the study participants. When patients with mild or moderate COPD were compared with those with severe or very severe COPD, the groups did not differ. Neither were there differences between the groups on scores on the BAI, the BDI and the PSQI, Table 3 provides mean scores on the SGRQ, the BAI, the BDI, and the PSQI for the total sample and subgroups according to FEV₁.

Gender differences

Comparison of men and women showed statistically significant differences on FEV₁, age, the BAI, and medical co-morbidity. Women had better FEV₁ values, were younger, exhibited more anxiety on the BAI, and had more co-morbid medical conditions. There were no statistically significant gender differences on the BDI, SGRQ, and the PSQI. See

Table 4 for an overview of mean scores of men and women on the primary study measures.

Discussion

In COPD patients with co-morbid anxiety and/or depression, disease severity as measured with spirometry (FEV₁) was not related to health status. Impaired health status was however positively associated with psychological distress, as indicated by symptoms of anxiety and depression, frequency and length of hospitalizations, sleep disturbances and level of daily functioning. The results of this study parallel previous findings indicating that even patients with mild-to-moderate COPD may report substantially impaired health, and that mental health distress is more strongly related to health status than COPD severity or medical co-morbidity. It is also notable that in our sample, female patients, although younger and with less severe COPD than men, reported higher levels of psychological distress and an equal impairment of health status compared with the males.

There is today ample evidence of high prevalence of psychological distress in the COPD population, and an increasing number of studies are also emphasizing the role of mental health symptoms in impaired health status. In one study with COPD patients discharged after hospitalization, anxiety and depression affected scores on the SGRQ up to 12 units; three times what is regarded as clinically significant (Gudmundsson et al 2006). However, less attention has been paid to the impact of sleep difficulties on health status. Our

Table 3 Mean scores on primary study measures, total sample and subgroups according to forced expiratory volume in one second (FEV₁) % predicted, GOLD criteria

Scale	Total sample n = 58	FEV ₁ % predicted – GOLD criteria		t-test, p-values
		Mild/moderate COPD	Severe/very severe COPD	
		FEV ₁ ≥ 50% n = 29	FEV ₁ < 50% n = 29	
SGRQ Total	55.3 (13.8)	52.9 (12.9)	57.7 (14.5)	p = 0.187
SGRQ Symptoms	61.0 (19.9)	60.7 (18.6)	61.4 (21.5)	p = 0.899
SGRQ Activity	68.0 (17.2)	64.1 (17.8)	71.9 (16.0)	p = 0.083
SGRQ Impact	46.7 (15.2)	44.5 (13.0)	48.8 (17.1)	p = 0.289
BAI	15.6 (9.7)	16.7 (9.3)	14.5 (10.2)	p = 0.408
BDI	17.6 (8.4)	18.4 (9.0)	16.8 (7.7)	p = 0.474
PSQI	8.5 (3.7)	9.3 (3.8)	7.8 (3.5)	p = 0.156

Data are presented as mean + SD. SGRQ: St. George's Respiratory Questionnaire; BAI: Beck Anxiety Inventory; BDI: Beck Depression Inventory, 2nd edition; PSQI: Pittsburgh Sleep Quality Index. On the SGRQ, BAI, BDI and PSQI, higher scores mean greater impairment.

findings indicate that, in addition to psychological distress, also sleep disturbances may be related to health status even in the early stages of the disease.

Fatigue is recognized as one of the most common and important symptoms in COPD (Janson-Bjerklie et al 1986). In our sample, the PSQI component that assesses sleepiness and fatigue during the day (Daytime Functioning) was strongly correlated with health status. A sensation of fatigue can be a consequence of poor sleep quality or mood disorders, but there is also strong evidence for an association between dyspnea and fatigue, and it has been suggested that fatigue may be a sign of a worsening condition in people with COPD (Kapella et al 2006). The relationship between daytime functioning and health status could thus reflect the impact of disease severity on patients' perceptions of their health. However, relatively little is known about the specific mechanisms and triggers of fatigue, and more research is

needed to clarify the interrelationships between fatigue and other factors.

Certain limitations of the present study should be noted. Our sample size was relatively small, which reduces the statistical power, decreasing the likelihood of detecting a significant difference when one truly exists. Due to the fact that the current study uses a cross-sectional design, assumptions concerning causal relations cannot be made. No significant relationship between COPD severity and health status was found in the current investigation, but this finding may be due to the deficits related to using FEV₁ as a measure of COPD severity. Although COPD has its primary effect in the lungs, changes take place also in other organs, and important effects of COPD, such as fatigue, may have no direct relationship to expiratory airflow limitation (Jones 2001). Thus, it is possible that the categorizations according to FEV₁ did not accurately reflect the severity of the disease. In addition, a criterion for inclusion in the current study was the presence of anxiety and/or depression. The relationships between psychological distress and health status might be different in other COPD populations.

Despite these limitations, the study raises some important issues concerning psychological disturbance and sleep problems in COPD patients, and their impact on the patients' health status. Even though complaints of poor sleep are common and studies have established irregularities in sleep among COPD patients, the interrelations between sleep, psychological distress and health status have received relatively little attention. Both psychological distress and sleep problems may aggravate the symptoms and intensify the effects of COPD on health status in all stages of disease severity, leading to findings of more impairment in health status as well as reduced quality of life. Or, poor health status

Table 4 Mean scores on primary study measures, men and women

	Men n = 34	Women n = 24	t-test, p-values
FEV ₁	48.6 (22.8)	61.2 (24.1)	p = 0.047
Age	64.2 (7.2)	59.2 (9.7)	p = 0.029
BAI	12.9 (9.1)	19.4 (9.6)	p = 0.012
BDI	16.5 (6.8)	19.3 (9.6)	p = 0.215
Hospitalizations Medical	1.1 (3.0)	0.5 (1.4)	p = 0.404
co-morbidities	1.4 (1.1)	2.3 (1.4)	p = 0.008
SGRQ total	54.9 (14.2)	56.0 (13.5)	p = 0.755
PSQI total	8.1 (3.6)	9.2 (3.8)	p = 0.317

Data are presented as mean + SD. FEV₁: Forced expiratory volume in 1 second; BAI: Beck Anxiety Inventory; BDI: Beck Depression Inventory, 2nd edition; Hospitalizations: Number of nights in hospital during the last two months; Medical co-morbidities: Number of other co-morbid medical conditions; SGRQ: St. George's Respiratory Questionnaire; PSQI: Pittsburgh Sleep Quality Index. On the SGRQ, BAI, BDI and PSQI, higher scores mean greater impairment.

as a consequence of the multiple structural and functional effects of COPD, not captured solely by the expiratory airflow limitation, may cause psychological distress and sleep disturbance. In our sample, in which all patients' had at least subclinical levels of anxiety or depression, sleep difficulties were not significantly related to symptoms of psychological distress. However, in other studies that did not specifically target patients with anxiety or depression, psychological distress was found to contribute to poor sleep (Bellia et al 2003; Kapella et al 2006).

Our findings also emphasize the importance of routinely screening the patients for anxiety, depression, and sleeping problems in order to provide adequate treatment for these problems. A study by Roundy et al (2005) suggests that depressive and anxiety disorders are recognized only in half of the patients, and even fewer are receiving adequate care. Although treatment studies of anxiety and depression in COPD patients are few and suffer from methodological limitations, both pharmacologic and non-pharmacologic interventions have shown promising results (Brenes 2003). In addition, it might be useful to target sleep problems in interventions aimed at improving the patients' health status and quality of life, and include measures of sleep quality when evaluating treatment outcomes.

References

Andenaes R, Kalfoss MH, Wahl A. 2004. Psychological distress and quality of life in hospitalized patients with chronic obstructive pulmonary disease. *J Adv Nurs*, 46:523–30.

Arnau RC, Meagher MW, Norris MP, et al. 2001. Psychometric evaluation of the Beck Depression Inventory-II with primary care medical patients. *Health Psychol*, 20:112–19.

Ballard RD. 2005. Sleep and medical disorders. *Prim Care*, 32:511–33.

Beck SL, Schwartz AL, Towsley G, et al. 2004. Psychometric evaluation of the Pittsburgh Sleep Quality Index in cancer patients. *J Pain Symptom Manage*, 27:140–8.

Beck AT, Steer RA. 1993. *Beck Anxiety Inventory. Manual*. San Antonio: Harcourt Brace & Co.

Beck AT, Steer RA, Brown GK. 1996. *Beck Depression Inventory – Second edition. Manual*. San Antonio: Harcourt Brace & Co.

Bellia V, Catalano F, Scichilone N, et al. 2003. Sleep disorders in the elderly with and without chronic airflow obstruction: the SARA study. *Sleep*, 26:318–23.

Brenes GA. 2003. Anxiety and chronic obstructive pulmonary disease: prevalence, impact, and treatment. *Psychosom Med*, 65:963–70.

Buyse DJ, Reynolds CF 3rd, Monk TH, et al. 1989. The Pittsburgh Sleep Quality Index: a new instrument for psychiatric practice and research. *Psychiatry Res*, 28:193–213.

Cully JA, Graham DP, Stanley MA, et al. 2006. Quality of life in patients with chronic obstructive pulmonary disease and comorbid anxiety or depression. *Psychosomatics*, 47:312–19.

Ferrer M, Alonso J, Morera J, et al. 1997. Chronic obstructive pulmonary disease stage and health-related quality of life. The Quality of Life of Chronic Obstructive Pulmonary Disease Study Group. *Ann Intern Med*, 127:1072–9.

Global Initiative for Chronic Obstructive Lung Disease. 2005. *Pocket guide to COPD diagnosis, management, and prevention. A guide for health care professionals*. [Online]. Accessed 15 Oct 2006. <http://www.goldcopd.org>

Godoy DV, Godoy RF. 2003. A randomized controlled trial of the effect of psychotherapy on anxiety and depression in chronic obstructive pulmonary disease. *Arch Phys Med Rehabil*, 84:1154–7.

Gudmundsson G, Gislason T, Janson C, et al. 2006. Depression, anxiety and health status after hospitalisation for COPD: a multicentre study in the Nordic countries. *Respir Med*, 100:87–93.

Guyatt GH, Berman LB, Townsend M, et al. 1987. A measure of quality of life for clinical trials in chronic lung disease. *Thorax*, 42:773–8.

Hajiro T, Nishimura K, Tsukino M, et al. 2000. Stages of disease severity and factors that affect the health status of patients with chronic obstructive pulmonary disease. *Respir Med*, 94:841–6.

Hynninen KMJ, Breivte MH, Wiborg AB, et al. 2005. Psychological characteristics of patients with chronic obstructive pulmonary disease: a review. *J Psychosom Res*, 59:429–43.

Janson-Bjerkle S, Carrieri VK, Hudes M (1986). The sensations of pulmonary dyspnea. *Nursing Research*, 35:154–59.

Jones PW. 2001. Health status measurement in chronic obstructive pulmonary disease. *Thorax*, 56:880–7.

Jones PW. 2006. Health status: what does it mean for payers and patients? *Proc Am Thorac Soc*, 3:222–6.

Jones PW, Quirk FH, Baveystock CM, et al. 1992. A self-complete measure of health status for chronic airflow limitation. The St. George's Respiratory Questionnaire. *Am Rev Respir Dis*, 145:1321–7.

Kapella MC, Larson JL, Patel MK, et al. 2006. Subjective fatigue, influencing variables, and consequences in chronic obstructive pulmonary disease. *Nurs Res*, 55:10–17.

Kinsman RA, Yaroush RA, Fernandez E, et al. 1983. Symptoms and experiences in chronic bronchitis and emphysema. *Chest*, 83:755–61.

McCarthy HC, Spence SH, Tate RL. 2002. Adjustment to chronic obstructive pulmonary disease: the importance of psychological factors. *Eur Respir J*, 19:47–53.

Mohsenin V. 2005. Sleep in chronic obstructive pulmonary disease. *Semin Respir Crit Care Med*, 26:109–16.

Persoons P, Luyckx K, Desloovere C, et al. 2003. Anxiety and mood disorders in otorhinolaryngology outpatients presenting with dizziness: validation of the self-administered PRIME-MD Patient Health Questionnaire and epidemiology. *Gen Hosp Psychiatry*, 25:316–23.

Roundy K, Cully JA, Stanley MA, et al. 2005. Are Anxiety and Depression Addressed in Primary Care Patients With Chronic Obstructive Pulmonary Disease? A Chart Review. *Prim Care Companion J Clin Psychiatry*, 7:213–18.

Ståhl E, Lindberg A, Jansson SA, et al. 2005. Health-related quality of life is related to COPD disease severity. *Health Qual Life Outcomes*, 3:56.

Wetherell JL, Areán PA. 1997. Psychometric evaluation of the Beck Anxiety Inventory with older medical patients. *Psychological Assessment*, 9:136–44.