

CHEST[®]

Official publication of the American College of Chest Physicians



Anxiety and Depression in COPD

Janet Maurer, Venkata Rebbapragada, Soo Borson, Roger Goldstein,
Mark E. Kunik, Abebaw M. Yohannes and Nicola A. Hanania

Chest 2008;134;43S-56S
DOI 10.1378/chest.08-0342

The online version of this article, along with updated information
and services can be found online on the World Wide Web at:
http://www.chestjournal.org/content/134/4_suppl/43S.full.html

CHEST is the official journal of the American College of Chest Physicians. It has been published monthly since 1935. Copyright 2007 by the American College of Chest Physicians, 3300 Dundee Road, Northbrook IL 60062. All rights reserved. No part of this article or PDF may be reproduced or distributed without the prior written permission of the copyright holder.
(<http://www.chestjournal.org/site/misc/reprints.xhtml>) ISSN:0012-3692

A M E R I C A N C O L L E G E O F
 C H E S T
P H Y S I C I A N S[®]



Anxiety and Depression in COPD*

Current Understanding, Unanswered Questions, and Research Needs

Janet Maurer, MD, MBA, FCCP; Venkata Rebbapragada, MD; Soo Borson, MD; Roger Goldstein, MBChB, FCCP; Mark E. Kunik, MD, MPH; Abebaw M. Yohannes, PhD; and Nicola A. Hanania, MBBS, MD, FCCP; for the ACCP Workshop Panel on Anxiety and Depression in COPD†

Background: Approximately 60 million people in the United States live with one of four chronic conditions: heart disease, diabetes, chronic respiratory disease, and major depression. Anxiety and depression are very common comorbidities in COPD and have significant impact on patients, their families, society, and the course of the disease.

Methods: We report the proceedings of a multidisciplinary workshop on anxiety and depression in COPD that aimed to shed light on the current understanding of these comorbidities, and outline unanswered questions and areas of future research needs.

Results: Estimates of prevalence of anxiety and depression in COPD vary widely but are generally higher than those reported in some other advanced chronic diseases. Untreated and undetected anxiety and depressive symptoms may increase physical disability, morbidity, and health-care utilization. Several patient, physician, and system barriers contribute to the underdiagnosis of these disorders in patients with COPD. While few published studies demonstrate that these disorders associated with COPD respond well to appropriate pharmacologic and nonpharmacologic therapy, only a small proportion of COPD patients with these disorders receive effective treatment.

Conclusion: Future research is needed to address the impact, early detection, and management of anxiety and depression in COPD. (CHEST 2008; 134:43S–56S)

Key words: anxiety; comorbidities; COPD; depression; mood disorders

Abbreviations: ACCP = American College of Chest Physicians; CBT = cognitive behavior therapy; CES-D = Center for Epidemiologic Studies-Depression; DSM-IV = *Diagnostic and Statistical Manual of Mental Disorders, 4th ed*; HADS = Hospital Anxiety and Depression Scale; PHQ-9 = Patient Health Questionnaire-9; PR = pulmonary rehabilitation; PRIME-MD = Primary Care Evaluation of Mental Disorders; SSRI = selective serotonin reuptake inhibitor

COPD is a disease with multiple comorbidities. Two of the most common and least-treated comorbidities of COPD are anxiety and depression. However, only a few prospective studies have addressed how to diagnose and manage these disorders and determine their impact on health status among patients with COPD. We report the proceedings of a 2-day workshop organized by the American College of Chest Physicians (ACCP) and held in Chicago in September 2006. This workshop was sponsored by the National Institute of Mental Health and the Alpha-1 Foundation. The objectives of this workshop were to review current knowledge and identify unanswered questions and needs for future research. The workshop included didactic lectures during

which speakers summarized current literature and outlined unanswered questions. Several breakout groups then discussed these unanswered questions and outlined by consensus future research needs for each of the identified discussion topics, which are outlined below.

THE SCOPE OF THE PROBLEM

Burden of COPD

COPD is a largely preventable and treatable disease responsible for a substantial human and economic burden throughout the world.¹ It is currently the fourth-leading cause of death in the United

States and is expected to surpass stroke within the next decade to become the third-leading cause of death.² The diagnosis of COPD is based on the documentation of a postbronchodilator FEV₁/FVC < 70%.^{3,4} Using this definition, 23.6 million adults (13.9%) in the United States have COPD and 2.4 million adults have moderate-to-severe airways obstruction (FEV₁ < 50% of predicted). More recently, a study⁵ from South and Central America reported a COPD prevalence of 7.8 to 19.7%.

Prevalence and Impact of Anxiety and Depression in COPD

Anxiety and depression often appear together in patients with COPD.⁶ While the exact causes of these symptoms have not been well defined, several variables have been implicated and are summarized in Table 1. Prevalence estimates vary widely, due in part to the use of varied measurement tools and to the different degrees of illness severity across studies. In stable COPD, the prevalence of clinical depression ranges between 10% and 42%, while that of anxiety ranges between 10% and 19% (Table 2).^{6–25} The risk of depression (odds ratio, 2.5; 95% confidence interval, 1.2 to 5.4) is higher in patients with severe COPD compared to control subjects,⁷ with the highest rates, up to 62%, found in oxygen-dependent patients.¹³ In patients who have recently recovered from an acute exacerbation of COPD, the prevalence of depression is high and ranges between 19.4% and 50%, while anxiety ranges between 9.3% and 58% (Table 3).^{26–31} In a systematic review³² of 64 studies that focused on patients with severe disease, the prevalence of depression ranged from 37 to 71%, and that of anxiety from 50 to 75%, figures comparable to or higher than prevalence rates in

Table 1—Variables Associated With Depression and Anxiety in Patients With COPD

Physical disability ⁶
Long-term oxygen therapy ¹³
Low body mass index ⁶
Severe dyspnea ¹⁰⁵
Percentage of predicted FEV ₁ < 50% ⁷
Poor quality of life ^{26,35,105}
Presence of comorbidity ⁷
Living alone ⁷
Female gender ^{6,105}
Current smoking ^{6,26}
Low social class status ⁶

other advanced diseases such as cancer, AIDS, heart disease, and renal disease.

Patients with COPD may have a spectrum of symptom severity ranging from short-term depressive symptoms to dysthymia (long-term chronic symptoms that are not disabling) to clinical depression. A few studies^{12,33} have reported that approximately two thirds of COPD patients with depression have from moderate-to-severe depression. However, the prevalence of minor or subclinical depression may be even higher in this population, assuming that it is similar to other chronic illnesses. In one study,³⁴ it was reported that approximately one fourth of COPD patients had unrecognized subclinical depression. Such patients commonly have a high burden of physical disability and are at risk for a major depression.

Depression and anxiety are often untreated or undertreated in patients with COPD.³⁵ In two studies,^{6,33} fewer than one third of patients were receiving appropriate treatment. Untreated or incompletely treated depression and anxiety have major implications for compliance with medical treatment, increased frequency of hospital admissions, prolonged length of stay, and increased consultations with primary care physicians.^{6,22,26} Lack of treatment is also associated with poor quality of life and premature death.^{26,34–36} Collaborative care models developed for treatment of depression in patients with other chronic diseases have not been adequately tested in COPD.

The impact of anxiety and depression on COPD patients, their families, and society is significant. Depressed patients with a chronic medical illness are usually sicker than their counterparts^{37–46} and have lower treatment adherence.^{37,47–51} Depression has been found to predict fatigue, shortness of breath, and disability in patients with heart disease or COPD, even after adjusting for severity of illness.^{52–56} Medical costs are significantly higher for patients with chronic medical illness and major

*From Health Dialog, Inc. (Dr. Maurer), Phoenix, AZ; Section of Pulmonary and Critical Care Medicine (Drs. Rebbapragada and Hanania), Baylor College of Medicine, Houston, TX; Psychiatry and Behavioral Sciences (Dr. Borson), University of Washington School of Medicine, Seattle, WA; Medicine and Physical Therapy (Dr. Goldstein), University of Toronto, Toronto, ON, Canada; Michael E. DeBakey Veterans Affairs Medical Center (Dr. Kunik), Houston, TX; and Manchester Metropolitan University (Mr. Yohannes), Manchester, UK.

†A list of speakers is given in the Appendix.

This workshop was supported by grant R13-MH073228-01A1 from the National Institute of Mental Health and the Alpha-1 Foundation.

The authors disclose that no financial or other potential conflicts of interest exist.

Manuscript received February 6, 2008; revision accepted June 26, 2008.

Reproduction of this article is prohibited without written permission from the American College of Chest Physicians (www.chestjournal.org/misc/reprints.shtml).

Correspondence to: Nicola A. Hanania, MBBS, MD, FCCP, Associate Professor of Medicine, Section of Pulmonary and Critical Care Medicine, 1504 Taub Loop, Houston, TX 77030; e-mail: Hanania@bcm.edu

DOI: 10.1378/chest.08-0342

Table 2—Prevalence of Depression and Anxiety in Outpatients With COPD*

Studies	Screening Tools	Prevalence of Anxiety, %	Prevalence of Depression, %	Source of Patients	Mean Age, yr	FEV ₁	Male/Female Gender, No.
Di Marco et al ¹⁰⁵	STAI ZSDS	28	19	Outpatient	68	54%	155/47
van Manen et al ⁷	CES-D	NP	25	GPs	73	< 50%	44/16
			20		72	> 50%	72/30
Kunik et al ⁶	PRIME-MD	80	80	GPs/outpatient	64	< 70%	1,243/91
	SCID	19	23		66	< 50%	196/8
Yohannes et al ¹²	GMS	18	42	Outpatient	73	40%	69/68
	BASDEC		46				
Lacasse et al ¹³	GDS > 11		57	Outpatient (LTOT)	71	34%	63/46
	GDS > 20		18				
Aghanwa and Erhabor ¹⁴	PSE/ICD-10	10	17	Outpatient	63		25/5
McSweeney et al ¹⁵	MMPI	NP	42	Outpatient	65	0.75 L	160/43
Light et al ¹⁶	BDI STAI	2	42	Outpatient	62	0.70 L	
Isoaho et al ¹⁷	ZSDS		26	Outpatient	71		61/22
Borak et al ¹⁸	BDI MAS	38	79	Outpatient	57	1.06 L	34/14
Engstrom et al ¹⁹	HAD	13	7	Outpatient	64	68%	43/25
White et al ²⁰	HAD	40	32	Outpatient	66	< 40%	28/16
Eiser et al ²¹	HAD	55	NP	Outpatient	72	37%	8/10
Bosley et al ²²	HAD	28	20	Outpatient	65		48/45
Jones et al ²³	HAD	47	29	Outpatient	63	42%	92/49
Ries et al ²⁴	CES-D	NP	24	Outpatient	63	1.22 L	87/32
Karajgi et al ²⁵	DSM-III-R	16	NP	Outpatient	65	50%	31/19

*GP = general practitioner; LTOT = long-term oxygen therapy; BASDEC = Brief Assessment Schedule Depression Cards; BDI = Beck Depression Inventory; MAS = Taylor Manifest Anxiety Scale; ZSDS = Zung Depression Scale; MMPI = Minnesota Multiphasic Personality Inventory; STAI = State-Trait Anxiety Inventory; HSCL-25 = Hopkins symptom checklist-25; NP = not performed or documented; GMS = Geriatric Mental State Schedule; SCID = DSM-IV; DSM III-R = *Diagnostic and Statistical Manual of Mental Disorders, 3rd ed*; PSE/ICD-10 = Present State Examination and clinical evaluation based on International Classification of Diseases, Tenth Revision; GDS = Geriatric Depression Scale.

depression than those with chronic illness alone.^{37,38} Depression adversely affects physical functioning in people with COPD, such as reduced 12-min walk distance.¹⁶ Felker et al⁵⁷ suggest that up to 18% of the variance in physical functioning among people with COPD can be attributed to depressive symptoms. In addition, depression lowers quality of life and decreases adherence to treatment.^{22,58} By compromising health status, mood disorders may lead to increased risk of hospitalization⁵⁹ and rehospitalization.⁶⁰ Depression may also be a significant predictor of mortality following hospitalization for acute exacerbations.⁶¹ Results from the National Emphysema Treatment Trial⁶² reveal that depression increases all

hospitalizations, including hospitalizations for respiratory conditions and COPD hospitalizations. In the same trial,⁶² the mortality rate among depressed patients during a 3-year period was increased. Furthermore, depression has been found to have a profound impact on end-of-life decisions because depressed patients more often opt for “do not resuscitate” decisions.⁵⁸

Considerations in Special Populations: Gender, Ethnicity, Race

Comorbid psychiatric and physical illness presents a unique health-care challenge for persons from culturally and ethnically diverse populations and for

Table 3—Prevalence of Depression and Anxiety After Recovery in Patients Admitted With Acute Exacerbations of COPD*

Studies	Screening Tools	Prevalence of Anxiety, %	Prevalence of Depression, %	Mean Age, yr	FEV ₁	Male/Female Gender, No.
Gudmundsson et al ²⁶	HAD	19.4	9.3	69	39%	205/211
Yohannes ²⁷	BASDEC	NP	56	73	39%	48/52
Andenaes et al ^{28,29}	HSCL-25		58	69	NP	40/52
Dowson et al ³⁰	HADS	50	28			42/37
Yellowlees et al ³¹	DSM III-R	34	16	65	1.1 L	32/18

*See Table 2 for expansion of abbreviations.

the health-care professionals who develop health-care strategies and protocols for them. Research is just beginning to examine variables involved in the comorbid occurrence of depression and anxiety in culturally and ethnically diverse populations with COPD. Effective management of anxiety and depression in diverse populations is hampered by many of the same barriers found in managing the white population with COPD. However, the diagnosis may be more difficult because of the variations in disease presentation among patients from different cultural backgrounds, as well as perceptions of the social unacceptability of having a “mental” diagnosis. Management is also complicated by health-care disparities, mistrust of the system, and communication channels that do not incorporate cultural and language differences. A collaborative research approach is needed to develop, implement, and evaluate culturally competent service delivery systems that are responsive to the cultural concerns and needs of diverse groups.

Unanswered Questions

Several questions regarding the prevalence and impact of anxiety and depression in COPD remain unanswered. High-priority questions include the following: (1) What is the prevalence of *Diagnostic and Statistical Manual of Mental Disorders, 4th ed* (DSM-IV)-defined disorders of anxiety and depression in COPD? (2) Are anxiety and depression in COPD different from anxiety and depression in non-COPD individuals or in smokers? (3) What are the early predictors of depression and anxiety in COPD that may lead to the development of preventive strategies? (4) Which mechanisms contribute to the development of depression and anxiety in COPD? (5) Which factors determine the course of these comorbidities? (6) Are there gender or ethnic differences in anxiety and depression? (7) How do anxiety and depression affect costs, quality of life, and treatment adherence?

Ongoing and Future Needs

Future studies investigating the scope of the problem of mood disorders in COPD should focus on the following: (1) using standardized diagnostic criteria and screening instruments across studies of anxiety and depression; (2) assessing the impact of anxiety and depression on health-care costs, health-related quality of life, social activities, and disease outcomes, such as treatment adherence; (3) identifying risk factors including genetic predisposition, disease severity, duration, hypoxemia, smoking status, systemic inflammation, geographic location, psychosocial milieu, and personality type; (4) studying

diverse populations, of both genders, who are managed in different practice settings; (5) utilizing multidisciplinary research teams with skills consistent with the goals of the research; (6) developing collaborative-care delivery systems responsive to all patients with anxiety and depression, as well as culturally and ethnically diverse groups; and (7) identifying preventive strategies or lifestyle behaviors in patients with primary mood disorders that predispose to increased risk of smoking and the development of COPD.

DETECTING MOOD/ANXIETY DISORDERS IN THE COPD POPULATION

Screening for Anxiety and Depression

Many of the somatic symptoms of a major depression overlap with symptoms caused by severe COPD, although sustained depressed mood and marked loss of pleasure in life should not be attributed to lung disease alone. The Global Initiative for Chronic Obstructive Lung Disease guidelines³ recommend that new COPD patients should have a detailed medical history including an “assessment of feelings of depression or anxiety.” Similarly, primary care guidelines⁶³ recommend screening for mental health problems. However, there is no consensus as to the most appropriate screening approach.⁶⁴

Kunik et al,^{6,65} as a part of a randomized controlled trial evaluating cognitive behavioral therapy (CBT) for anxiety and depression in patients with COPD, examined a screening tool to identify patients with at least moderate anxiety or depressive symptoms. Patients underwent telephone screening with the three-question anxiety and two-question depression screen from the Primary Care Evaluation of Mental Disorders (PRIME-MD) patient health questionnaire (Table 4).⁶⁶ Regardless of results, patients were encouraged to undergo baseline evaluation with the Beck Anxiety Inventory and Beck

Table 4—PRIME-MD Screening Questionnaire for Depression and Anxiety*

Depression screen (PHQ-2)
In the past month, have you been bothered a lot by:
1. Little interest or pleasure in doing things?
2. Feeling down, depressed, or hopeless?
Anxiety screen (PHQ-3)
In the past month, have you been bothered a lot by:
1. “Nerves,” or feeling anxious or on edge?
2. Worrying about a lot of different things?
During the last month:
3. Have you had an anxiety attack (suddenly feeling fear or panic)?

*PHQ-2 = two-item Patient Health Questionnaire; PHQ-3 = three-item Patient Health Questionnaire.

Depression Inventory-II. The study⁶⁶ concluded that the combined components of the PRIME-MD were highly sensitive and had a reasonably good positive predictive value for screening for anxiety and depression, and that they can serve as a useful, easily administered screening tool for use by primary care providers. The limitation of this study is that it did not use DSM-IV criteria for depression (Table 5) as the “gold standard.”

Although there is limited literature on screening among COPD patients, the primary care literature is replete with studies examining the assessment, diagnosis, and treatment of depression in many other chronic illnesses. The Patient Health Questionnaire-9 (PHQ-9) is a nine-item measure that emulates the DSM-IV and is useful for making a diagnosis of depression and monitoring response to treatment.⁶⁷ Other scales that may be considered for depression screening include the Center for Epidemiologic Studies-Depression (CES-D) scale,⁶⁸ Geriatric Depression Scale,⁶⁹ and the Zung Self-Rating Depression Scale.⁷⁰ Anxiety screening instruments have received less attention. The following are all reasonable choices for screening anxiety: the Hospital Anxiety and Depression Scale (HADS),⁷¹ Depression Anxiety Stress Scale,⁷² and the Beck Anxiety Inventory.⁷³

Barriers to the Detection and Management of Anxiety and Depression in COPD

There are several patient-, physician-, and system-level barriers⁷⁴ (Table 6). Patient barriers include

lack of knowledge about the possibility of anxiety or depression as well as their treatment options. Stigma regarding mental illness may include the belief that depression is a personal and family issue not to be discussed with physicians. Other barriers may include preference for depression care within the primary care system, and therapies that may be limited by insurance coverage or accessibility.⁷⁴ In addition, patients may blame themselves for their disease, further weakening their motivation to seek diagnosis and treatment of associated depression. Physician barriers include short clinical visit times, the lack of close follow-up, the lack of time for educating patients about depression and counseling, limited skills, and knowledge of mood disorders. System issues include the lack of electronic records and registries, poor communication between primary care and mental health care, emphasis on productivity measured as patient throughput, and absence of reimbursement.

The Primary Care Perspective

Many primary care physicians or caregivers of people with COPD are often surprised that depression is common.^{15,27} The diagnosis of COPD is often made only after patients present with symptoms that have demanded a change in lifestyle and a reduction in quality of life.⁷⁵ In this setting, it may be the identification of COPD that is most crucial to improving care of depression in patients with COPD. While most primary care physicians inquire about and record smoking status, few assess symptoms

Table 5—DSM-IV Criteria for Major Depressive Episode

-
1. Five (or more) of the following symptoms have been present during the same 2-wk period and represent a change from previous functioning; at least one of the symptoms is either (1) depressed mood or (2) loss of interest or pleasure
 - (a) Depressed mood most of the day, nearly every day, as indicated by either subjective report (*eg*, feels sad or empty) or observation made by others (*eg*, appears tearful). Note: In children and adolescents, irritability may be observed.
 - (b) Markedly diminished interest or pleasure in all, or almost all, activities most of the day, nearly every day (as indicated by either subjective account or observation made by others)
 - (c) Significant weight loss when not dieting or weight gain (*eg*, a change of > 5% of body weight in a month) or decrease or increase in appetite nearly every day. Note: In children, consider failure to make expected weight gains
 - (d) Insomnia or hypersomnia nearly every day
 - (e) Psychomotor agitation or retardation nearly every day (observable by others, not merely subjective feelings of restlessness or being slowed down)
 - (f) Fatigue or loss of energy nearly every day
 - (g) Feelings of worthlessness or excessive or inappropriate guilt (which may be delusional) nearly every day (not merely self-reproach or guilt about being sick)
 - (h) Diminished ability to think or concentrate, or indecisiveness, nearly every day (either by subjective account or as observed by others)
 - (i) Recurrent thoughts of death (not just fear of dying), recurrent suicidal ideation without a specific plan, or a suicide attempt or a specific plan for committing suicide
 2. The symptoms do not meet criteria for a mixed episode
 3. The symptoms cause clinically significant distress or impairment in social, occupational, or other important areas of functioning
 4. The symptoms are not due to the direct physiologic effects of a substance (*eg*, a drug of abuse, a medication) or a general medical condition (*eg*, hypothyroidism)
 5. The symptoms are not better accounted for by bereavement, *ie*, after the loss of a loved one, the symptoms persist for > 2 mo, or are characterized by marked functional impairment, morbid preoccupation with worthlessness, suicidal ideation, psychotic symptoms, or psychomotor retardation
-

Table 6—Barriers to the Detection and Management of Anxiety and Depression in Patients With COPD

Patient-level barriers
Lack of knowledge about depression and treatment options
Stigma about mental illness: the belief that depression is a personal and family issue not to be discussed with physicians
Preference for depression care within the primary care system and preference for psychotherapy (which may be limited by insurance coverage) or, in rural areas, the lack of mental health practitioners
Reluctance to disclose symptoms of depression or anxiety unless they are specifically asked for these symptoms
Masking of mood disorder symptoms by physical symptoms such as fatigue, decrease exercise tolerance and excessive response dyspnea
Physician-level barriers
Lack of standardized approach to the diagnosis of depression and anxiety in patients with COPD
Poor utilization of screening instruments by health-care professionals
Lack of confidence and skills to pursue psychological (psychiatric) assessment
Short time periods for visits; lack of close follow-up leading to lack of time to evaluate and educate patients about their disease and its comorbidities
Lack of ability to closely monitor adherence and outcomes
System-level barriers
Lack of electronic records and disease registries
Poor communication between primary care and mental health systems
Emphasis on physician productivity rather than time with patients
Lack of adequate insurance for mental health treatment

associated with smoking that may lead to a suspicion of COPD, such as chronic productive cough, dyspnea with exertion, or change in functional status due to breathing difficulties. For primary care, this must also be a priority when considering COPD and depression. The United States Preventive Services Task Force currently recommends that all adults be screened for depression. This includes those with chronic illnesses such as COPD. But the United States Preventive Services Task Force highlights that no screening program should ever be started without first establishing a system of follow-up, treatment, and monitoring.⁶⁴ Probably the most commonly used tool in primary care for depression screening is the PHQ-9 (www.predictonline.com/phq9.htm).

Primary care physicians either provide total care or provide continuity when patients are seeing several specialists; therefore, they are uniquely able to deal with the person with depression, COPD, and the multiple other conditions that may be present in people with long smoking histories. van Ede et al⁷⁶ noted the paucity of well-designed studies on depression as a comorbidity in COPD. There is clearly a role for collaborative care between family physicians, respiratory specialists, and mental health professionals in diagnosing, treating, and monitoring depression in patients with COPD.

COPD Mood/Anxiety Disorder Screening: Implications for Public Policy

Depression can be managed effectively using a chronic care model in the primary care settings. Patients with comorbid depression and general medical illness are more impaired, have higher mortality, and have 50 to 100% higher medical costs than those

without depression, even after controlling for demographics and severity of medical illness.

A number of initiatives are underway to address the barriers to treating patients with chronic behavioral health and general medical conditions. The Robert Wood Johnson Foundation established the national Depression in Primary Care: Linking Clinical and Systems Strategies Program. This program supports projects that test interventions designed to improve depression care that have a number of common elements, particularly screening and case identification, patient education and activation, care management, and coordination with mental health specialty care. Moving these models into everyday practice requires overcoming both clinical and system barriers. A better understanding of these barriers for different stakeholder levels (*eg*, patients, providers, practices/delivery systems, plans, and public/private purchasers, and populations/policy makers) is needed to develop and implement strategies to overcome these barriers and to improve the quality of depression care for patients with other chronic health conditions.⁷⁷

The Robert Wood Johnson Foundation Depression in Primary Care Program has also addressed barriers to financing effective treatment models for depression that are delivered in primary care settings. “Financial silos” can occur when behavioral health services are “carved out” to managed mental health plans that offer the following: (1) no incentives (and often do not pay) for physicians to participate in the diagnosis and management of depression in general medical settings; or (2) fail to support linkages between general medical providers and mental health specialty providers to improve the

access and quality of care; or (3) do not fund care management to provide the institutional “glue” to engage and follow patients. Depression care management programs have proven successful in many different settings, and there are also several different funding mechanisms to support these services: (1) practice-based care management on a fee-for-service basis; (2) practice-based care management under contract to health plans; (3) global capitation; (4) flexible infrastructure support for chronic care management; (5) health plan-based care management; (6) third-party-based care management under contract to health plans; and (7) and hybrid models.⁷⁸

Another promising chronic care improvement program is the Medicare Health Support Program established by the Centers for Medicare and Medicaid Services in 2004, which focuses on patients with multiple chronic diseases. The National Institute of Mental Health has funded a team of researchers to work with Centers for Medicare and Medicaid Services and the participating disease management organizations to investigate the role of comorbid depression in moderating the clinical and cost-effectiveness of the Medicare Health Support Program.

Summary

Patients with COPD should be screened for depression on presentation and whenever their clinical, economic, or psychosocial status changes. A variety of validated, easily administered, or self-administered depression screening tools are available. Common choices include the Patient Health Questionnaire-2 two-question screener. The PHQ-9 nine-question screener can be scored and is useful for diagnosis and follow-up. Less commonly used choices include the Zung Self-Rating Depression Scale and the CES-D.

Patients with COPD should also be screened for anxiety. Several tools, including the Patient Health Questionnaire-3, a three-question screener, and the HADS, are available but are not as well validated as the depression screening tools. Patients who screen positive should undergo a clinical interview for further assessment. Those with a diagnosis of depression should be considered for treatment that may include pharmacology, CBT, and pulmonary rehabilitation (PR).

Unanswered Questions

Several questions regarding the detection of anxiety and depression in COPD remain unanswered. High-priority questions include the following: (1) How much knowledge do primary and specialist health-care professionals have regarding screening for and treating mood or anxiety disorders in patients with COPD? (2) What percentage of COPD patients

have anxiety and depression that are undiagnosed and untreated? (3) Can existing screening instruments be used in diverse COPD populations across gender, age, and racial groups? (4) Are brief screening tools valid and reliable compared with structured clinical interviews? (5) Which screening tools are evaluative in COPD patients? (6) Can valuable information be obtained by adding cognitive screening to studies of mental health in COPD? (7) How do we overcome system, physician, and patient barriers to the diagnosis and management of anxiety and depression? (8) How do we restructure health-care delivery to incorporate care for mood and anxiety disorders as an integral part of quality patient management?

Ongoing and Future Needs

Ongoing and future needs include the following: (1) all health-care professionals caring for COPD patients need to be alert for depression and anxiety symptoms; (2) the topics of anxiety and depression should be included in undergraduate and graduate health-care professional continuing medical education programs on the management of COPD; the application of screening tools can be promoted in continuing medical education programs and by professional respiratory societies as well as those addressing mental health; (3) it is important to improve the quality of care for COPD and other medical conditions that have comorbid psychosocial impairments at the institutional and policy levels; (4) education of COPD patients regarding the relevance of associated depression and anxiety and their management in the context of chronic disease is very important; (5) there is great need to overcome barriers to the diagnosis and treatment of anxiety and depression, including the following: (a) the best approaches to increasing awareness of health-care professionals in dealing with mood disorders; (b) identifying ways to help patients readily accept treatment; (c) increasing access to mental health resources; and (d) payment systems that enable appropriate reimbursement for behavioral health care; (6) national COPD campaigns should stress the importance of psychosocial issues; and (7) funding organizations should incorporate funding for psychosocial issues in studies of COPD.

MANAGEMENT OF ANXIETY AND DEPRESSION IN COPD

Efficacy of Different Treatment Models in COPD

Managing depression and anxiety in primary and specialty medical settings starts with an accurate diagnosis. Many COPD patients have transitory

mood symptoms during respiratory exacerbations that improve spontaneously as their physical status improves. There is no evidence that these time-limited minor depressive symptoms require specific treatment. By contrast, major depression is likely to require antidepressant medication or other specific mood-focused therapy⁷⁹ to improve functioning and reduce the risk of chronic depression with its long-term adverse effects on overall disability.

Evidence for antidepressant therapy in COPD is limited, with only one small, randomized, placebo-controlled trial⁵³ of treatment in patients with major depression having been published. This study found high efficacy for nortriptyline, a tricyclic antidepressant, in improving short-term outcomes for depression, anxiety, panic attacks, cognitive function, and overall disability. A second small randomized placebo-controlled trial⁸⁰ using citalopram (a selective serotonin reuptake inhibitor [SSRI] antidepressant) in lung transplant patients with self-rated depressive symptoms, rather than major depression, found no overall benefit, with small improvements seen only in the less severely affected patients.

Anxiety and panic attacks are often associated with acute respiratory exacerbations but may also be associated with the pharmacologic effects of β_2 -agonists or high-dose corticosteroid therapy. If such attacks are frequent and meet specific diagnostic criteria, a panic disorder may be diagnosed (Table 7). In stable patients with severe COPD and marginal physiologic reserve, small amounts of exercise can precipitate panic attacks due to severe dyspnea sometimes accompanied by hypoxemia. This mechanism should be distinguished from panic disorders. Frequent panic attacks in COPD patients who are receiving medications as prescribed are most often related to a concurrent depressive syndrome, and treatment should be directed to both depressive and anxiety components.⁵²

As seen in other patients with depression, Yohannes and colleagues⁸¹ reported that people with COPD are reluctant to take yet another medication, and data supporting the efficacy of medication-only treatment are extremely limited.⁵² Psychological approaches to care have not been adequately developed or studied in clinically depressed COPD patients. Brief CBT will help decrease the sensation of dyspnea as well as symptoms of anxiety and depression. CBT is based on the assumption that individuals with emotional distress tend to interpret their life experiences in a distorted way. These distortions become “habitual errors in thinking,” for example, magnification, in which a minor insult is blown out of proportion. Over a period of time, these habitual errors in thinking become second nature, reflex, or automatic thoughts. CBT is a direct, reality-based therapy that involves educating the patient to identify this faulty thinking and correcting the thoughts to fit more closely with reality. Core concepts of CBT can be integrated into primary care interactions and can be useful adjuncts or alternatives to pharmacotherapy for depression and anxiety. In cases of severe major depression, CBT may be used to supplement the effects of antidepressant therapy.⁸²

In one pilot study⁹ of CBT, a single intensive 2-h session of CBT resulted in some improvement in depressive and anxiety symptoms relative to an education-only intervention. In another study⁸³ that compared CBT with COPD education in patients with anxiety and depressive symptoms, both treatments had a significant effect in improving quality of life and decreasing anxiety and depression ($p < 0.005$) over 8 weeks. These improvements were maintained during follow-up.⁸³

The Collaborative-Care Model in COPD

The Institute of Medicine “Chasm Report” has shown that most Americans with chronic illnesses such as COPD, asthma, diabetes, or major depres-

Table 7—DSM-IV Criteria for Panic Disorder

DSM-IV diagnostic criteria for panic disorder with or without agoraphobia; both (1) and (2)

(1) Recurrent unexpected panic attacks

(2) At least one of the attacks has been followed by 1 mo (or more) of one (or more) of the following:

- Persistent concern about having additional attacks
- Worry about the implications of the attack or its consequences (*eg*, losing control, having a heart attack, “going crazy”)
- Significant change in behavior related to the attacks
- Presence or absence of agoraphobia
- Panic attacks are not due to the direct physiologic effects of a substance (*eg*, a drug of abuse, a medication) or a general medical condition (*eg*, hyperthyroidism)
- Panic attacks not better accounted for by another mental disorder, such as social phobia (*eg*, occurring on exposure to feared social situations), specific phobia (*eg*, on exposure to a specific phobic situation), obsessive-compulsive disorder (*eg*, on exposure to dirt in someone with an obsession about contamination), posttraumatic stress disorder (*eg*, in response to stimuli associated with a severe stressor), or separation anxiety disorder (*eg*, in response to being away from home or close relatives)

sion are not receiving recommended care.⁴⁸ Only one half of patients with major depression receive an accurate diagnosis in primary care and, of those with a diagnosis of major depression, only one third to one half receive appropriate pharmacotherapy or psychotherapy.⁸⁴ In recent years, a model of care termed the *collaborative-care model* has been found to be associated with marked improvements in the quality of depression care in primary care and significant improvement in depression outcomes.⁷⁴ Gilbody et al⁸⁵ reported in a systematic review of 37 randomized trials of collaborative care vs usual primary care that a collaborative-care model was associated with a twofold increase in adherence to antidepressant medication over a 6-month period as well as significant improvement in depressive symptoms for 2 to 5 years.

Effective collaborative care is a multimodal intervention that has at least two core components: (1) use of allied health professionals (such as nurses) or mental health professionals to support primary care providers by helping improve patient education about depression; these individuals also provide follow-up, track outcomes with a depression tool such as the PHQ-9,⁸⁶ as well as track adherence to antidepressant medication; they facilitate return visits to the primary care physician for patients with persistent symptoms; and (2) consultation by a psychiatrist who provides case-load supervision to depression care managers and clinical advice and decision support to primary care physicians focusing on patients with persistent symptoms.⁷⁴

In recent years, collaborative-care models have been tested in patients with comorbid major depression and significant medical illness burden. For instance, the Pathways Study⁷⁴ examined the effectiveness of integrating a depression-care manager into primary care to enhance treatment of depression in patients with diabetes and major depression. The same intervention that was successful in patients with diabetes and comorbid depression was also tested in the Improving Mood–Promoting Access to Collaborative Treatment for Late Life Depression study⁸⁷ that randomized 1,801 elderly patients with major depression in eight health-care systems to a depression case manager vs usual primary care. These patients had a mean of three comorbid major medical illnesses, and >400 patients had COPD or asthma. This study⁸⁷ showed that the nurse collaborative-care intervention was associated with significant improvements in quality of depression care, depressive outcomes, and physical functioning compared to usual care over a 2-year period. The enhancements found in quality of care and depression and functional outcomes associated with collaborative care

were equally robust compared to usual primary care in the subgroup with COPD or asthma.

PR: an Example of a Collaborative-Care Model

PR is operationally defined as an intervention that is evidence based, multidisciplinary, and comprehensive.⁸⁸ It provides an example of one type of collaborative-care model, addressing the physical disease as well as the psychological factors associated with it. It is intended for patients with chronic respiratory diseases who are symptomatic and are having decreased daily life activities, and it is designed to reduce symptoms, optimize functional status, increase participation, reduce health-care costs, and address systemic manifestations of the disease.⁸⁸ Key outcomes such as exercise capacity and health-related quality of life may be accurately measured with valid, interpretable instruments.

The core components of PR comprise supervised exercise training, education, and psychological support.⁸⁹ The latter presents an ideal opportunity for a collaborative-care approach between those skilled in mental health and the multidisciplinary pulmonary team. Semistructured interviews and standardized questionnaires can address quality of life, adjustment to the disease, self-efficacy, motivation, and adherence to treatment strategies.⁸⁹ The high prevalence of symptoms consistent with anxiety or depression among those enrolling in PR means that such symptoms are often identified by COPD disease-specific quality of life instruments, such as the Chronic Respiratory Disease Questionnaire⁹⁰ or the St. George Respiratory Questionnaire.⁹¹ The issue of separating these symptoms from a major mood or anxiety disorder requiring prompt specialist care is an important one. Case-finding questionnaires for use in primary care have been reviewed.⁹² Depression among patients in PR is often evident in typical symptoms such as hopelessness and pessimism, as well as in less obvious symptoms such as difficulties with concentration and increased social withdrawal.⁷ Symptoms of anxiety may be reflected in a variety of ways, including agitation as well as physiologic signs of arousal such as tachycardia, sweating, and dyspnea.⁹³ Symptoms of anxiety may contribute to the patient's reluctance to engage in exercise as well as to difficulty concentrating. Dyspnea is a symptom of both COPD and anxiety; thus, it is particularly important to address in the rehabilitation setting. Because both depression and anxiety may be manifested in physical symptoms during the course of a rehabilitation program, collaborative care is essential among all involved health-care professionals. Regular communication will ensure that patient problems are identified, evaluated, and treated.

Managing depression within the framework of PR begins with the optimization of pharmacologic therapies, both respiratory and antidepressant. The improvement in airflow associated with effective bronchodilators will improve dyspnea and exercise tolerance.⁹⁴ Subsequent participation in supervised whole-body exercise training has been shown in several randomized controlled trials^{95–98} to improve symptoms of anxiety and depression as a consequence of training-related gains in functional capacity. Participation in a comprehensive education program will promote cognitive restructuring by dispelling common myths about COPD, such as “I am going to suffocate when I get short of breath,” and incorporate strategies of chronic disease self-management. Patients with chronic conditions can take responsibility for the day-to-day management of their condition, with the result of improving their confidence, control, and autonomy.⁹⁹ By providing patients with a structured, enjoyable activity, PR appears to help patients engage in behavior that may reduce depressive symptoms. In addition, from a behavioral perspective, the exercise and respiratory therapy components of PR may be instrumental in helping to desensitize patients who are excessively sensitive to dyspnea. In the rehabilitation setting, patients learn that they can have increases in activity levels and in dyspnea without perceiving that increase in dyspnea as a medical crisis.

Exercise-based PR programs have been among the most consistently helpful interventions for minor mood symptoms in COPD.^{98,100–102} Griffiths and colleagues⁹⁷ reported reduced symptoms of anxiety and depression following a 6-week PR program, with symptoms of depression remaining significantly reduced at 12-month follow-up. Emery and colleagues⁹⁶ found reductions in symptoms of anxiety and depression following a 10-week PR intervention. However, in an observational 12-month follow-up study of the same cohort, Emery et al¹⁰⁰ noted that participants who discontinued exercise had increases in depressive symptoms. Other observational studies^{71,90,91} have found similar reductions in symptoms of depression, anxiety, and emotional distress associated with PR. A study by de Godoy and de Godoy¹⁰³ reported reductions in depression and anxiety only among patients who participated in education and stress management in addition to exercise training during a 12-week intervention. They found that exercise training alone did not appear to have a beneficial effect on symptoms of depression and anxiety. However, the only study¹⁰⁴ of PR to address its effect on diagnosed major depression reported remission of depression in 39% of 63 inpatient program participants and clinically significant response in 51%. History of treatment for depression

was associated with limited change in depressive symptoms, whereas social support and satisfaction with treatment were predictors of improvement. All disability domains were lower at discharge compared to baseline ($p < 0.0001$). Subjects with pronounced disability at baseline had the greatest improvement if their depression improved by discharge. The authors¹⁰⁴ concluded that acute inpatient rehabilitation is followed by improvement of depressive symptoms and disability in older patients with COPD and major depression. However, while there is strong evidence that suggests PR improves exercise capacity and quality of life, the evidence for its impact on clinical anxiety and depression is less defined.

Biological mechanisms associated with exercise activity may affect depression and anxiety among patients undergoing PR. Possible mechanisms include changes in central monoamine function, enhanced hypothalamic-pituitary-adrenal axis regulation, increased release of endogenous opioids, and reduced systemic inflammation. In all likelihood, biological and behavioral mechanisms operate together to produce reductions of symptoms in the rehabilitation setting in patients with mild mood disorders.

The variable response among individuals to exercise training and the more limited response particularly in those with a history of depression treatment¹⁰⁴ suggest a subgroup of COPD patients require specific psychological interventions beyond that offered as part of PR. Within a collaborative-care model, this approach will include access to a clinical case manager responsible for coordinating and monitoring their response to treatment, access to a psychiatrist, and access to specific mental health treatments.⁸⁷ Managing depression within a collaborative-care model has been demonstrated to be effective in an older primary care population.⁸⁷

Summary

Clinical experience suggests that antidepressants such as SSRIs, tricyclic antidepressants, and low-dose benzodiazepines can be effective in treating some COPD patients with anxiety and depression. While the safety of these medications in patients with COPD has not been evaluated, SSRIs have been safely used in other chronic illnesses. Physicians need to be aware of potential drug interactions. Benzodiazepines should be used with caution in patients with hypercapnia, but low doses may be effective to treat anxiety. Tricyclic antidepressants are effective treatments for depression, anxiety, or insomnia, but must be used with more caution and monitoring given their potential for cardiotoxicity. PR can be a good example of a collaborative-care

model for COPD. It does improve depressive symptoms, but its effect beyond the duration of the rehabilitation program remains to be defined. Patients with major depressive disorder are less likely to respond. They require specialized care from a mental health professional.

Unanswered Questions

Unanswered questions regarding the management of depression and anxiety in patients with COPD include the following: (1) What is the effect of self-management on COPD and mental health outcomes? (2) What are the mechanisms of the effect of exercise on depression and anxiety in patients with COPD? (3) Which components of PR are essential for reducing symptoms of anxiety and depression? (4) Does exercise augment the effects of pharmacotherapy in COPD patients with anxiety or depression? (5) How do pharmacologic or psychological treatments for anxiety and depression compare with exercise alone? (6) Do novel pharmacologic therapies such as antiinflammatory agents or bronchodilators influence the course of anxiety and depression in patients with COPD? (7) Does PR have any benefit for COPD patients who present with both anxiety and depression? (8) Do more severely impaired COPD patients respond differently to antidepressants or anxiolytics?

Ongoing and Future Needs

Ongoing and future needs include the following: (1) prospective studies evaluating treatment approaches for depression and anxiety in COPD are a priority; such studies should address the effectiveness of different types of pharmacologic treatment, CBT, and the collaborative-care model of PR; (2) the effect of psychotherapies such as CBT, interpersonal therapy, and problem-based therapies should be studied in patients with COPD; and (3) other research priorities include the identification of appropriate instruments to assess outcomes of antidepressant or anxiolytic treatment.

SUMMARY

Symptoms of anxiety and depression are common in patients with COPD, but they are rarely diagnosed and treated appropriately because there are few published data to guide health-care professionals in the management of these symptoms. Furthermore, physician attitudes and patient beliefs both mitigate against optimal patient care. We have summarized the current state of knowledge, outlined some unanswered questions, and suggested areas for ongoing

and future clinical and research priorities. We hope that these may help to stimulate future work in this area and to improve the care of patients with COPD with these comorbidities.

APPENDIX

This report was developed from the proceedings of a workshop organized by the ACCP in Chicago, in September 2006. Workshop Chair: Janet Maurer, MD, Phoenix, AZ; Co-Chair: Nicola A. Hanania, MBBS, MS, Houston, TX.

Writing Committee Members

Janet Maurer, MD, MBA, FCCP, Phoenix, AZ; Nicola A. Hanania, MBBS, MD, FCCP, Houston, TX; Venkata Rebbapragada, MD, Houston, TX; Soo Borson, MD, Seattle, WA; Mark Kunik, MD, Houston, TX; Roger Goldstein, MBChB, FCCP, Toronto, ON, Canada; and Abebaw M. Yohannes, PhD, Manchester, UK.

Other Workshop Speakers/Panelists/Organizing Committee Members

Walter Bland, MD, Washington, DC; Charles Emery, MD, Columbus, OH; Rose Geist, MD, Toronto, ON, Canada; Wayne Katon, MD, Seattle, WA; William Lawson, MD, Washington, DC; David Mannino, MD, Lexington, KY; Paula Meek, PhD, Albuquerque, NM; Harold Pincus, MD, New York, NY; Aymarah Robles, MD, Miami, FL; Vijai Sharma, PhD, Cleveland, TN; Sandra Talley, PhD, New Haven, CT; John Walsh, Miami, FL; Barbara Jones Warren, PhD, Columbus, OH; and Barbara Yawn, MD, Rochester, MN.

ACKNOWLEDGMENT: The authors acknowledge the assistance of Ms. Lee Ann Fulton, Sydney Parker, PhD, and the staff and members of the Steering Committee of the Clinical Pulmonary Network of the ACCP for their assistance and input in organizing this workshop.

REFERENCES

- 1 Lopez AD, Shibuya K, Rao C, et al. Chronic obstructive pulmonary disease: current burden and future projections. *Eur Respir J* 2006; 27:397–412
- 2 Jemal A, Ward E, Hao Y, et al. Trends in the leading causes of death in the United States, 1970–2002. *JAMA* 2005; 294:1255–1259
- 3 Rabe KF, Hurd S, Anzueto A, et al. Global strategy for the diagnosis, management, and prevention of chronic obstructive pulmonary disease: GOLD executive summary. *Am J Respir Crit Care Med* 2007; 176:532–555
- 4 Celli BR, Macnee W. Standards for the diagnosis and treatment of patients with COPD: a summary of the ATS/ERS position paper. *Eur Respir J* 2004; 23:932–946
- 5 Menezes AM, Perez-Padilla R, Jardim JR, et al. Chronic obstructive pulmonary disease in five Latin American cities (the PLATINO study): a prevalence study. *Lancet* 2005; 366:1875–1881
- 6 Kunik ME, Roundy K, Veazey C, et al. Surprisingly high prevalence of anxiety and depression in chronic breathing disorders. *Chest* 2005; 127:1205–1211
- 7 van Manen JG, Bindels PJ, Dekker FW, et al. Risk of depression in patients with chronic obstructive pulmonary disease and its determinants. *Thorax* 2002; 57:412–416

- 8 Wagena EJ, Kant I, van Amelsvoort LG, et al. Risk of depression and anxiety in employees with chronic bronchitis: the modifying effect of cigarette smoking. *Psychosom Med* 2004; 66:729–734
- 9 Kunik ME, Braun U, Stanley MA, et al. One session cognitive behavioural therapy for elderly patients with chronic obstructive pulmonary disease. *Psychol Med* 2001; 31:717–723
- 10 Mikkelsen RL, Middelboe T, Pisinger C, et al. Anxiety and depression in patients with chronic obstructive pulmonary disease (COPD): a review. *Nord J Psychiatry* 2004; 58:65–70
- 11 Aydin IO, Ulusahin A. Depression, anxiety comorbidity, and disability in tuberculosis and chronic obstructive pulmonary disease patients: applicability of GHQ-12. *Gen Hosp Psychiatry* 2001; 23:77–83
- 12 Yohannes AM, Baldwin RC, Connolly MJ. Depression and anxiety in elderly outpatients with chronic obstructive pulmonary disease: prevalence, and validation of the BASDEC screening questionnaire. *Int J Geriatr Psychiatry* 2000; 15:1090–1096
- 13 Lacasse Y, Rousseau L, Maltais F. Prevalence of depressive symptoms and depression in patients with severe oxygen-dependent chronic obstructive pulmonary disease. *J Cardiopulm Rehabil* 2001; 21:80–86
- 14 Aghanwa HS, Erhabor GE. Specific psychiatric morbidity among patients with chronic obstructive pulmonary disease in a Nigerian general hospital. *J Psychosom Res* 2001; 50:179–183
- 15 McSweeney AJ, Grant I, Heaton RK, et al. Life quality of patients with chronic obstructive pulmonary disease. *Arch Intern Med* 1982; 142:473–478
- 16 Light RW, Merrill EJ, Despars JA, et al. Prevalence of depression and anxiety in patients with COPD: relationship to functional capacity. *Chest* 1985; 87:35–38
- 17 Isoaho R, Keistinen T, Laippala P, et al. Chronic obstructive pulmonary disease and symptoms related to depression in elderly persons. *Psychol Rep* 1995; 76:287–297
- 18 Borak J, Slivinski P, Piasecki Z, et al. Psychological status of COPD patients on long term oxygen therapy. *Eur Respir J* 1991; 4:59–62
- 19 Engstrom CP, Persson LO, Larsson S, et al. Functional status and well being in chronic obstructive pulmonary disease with regard to clinical parameters and smoking: a descriptive and comparative study. *Thorax* 1996; 51:825–830
- 20 White RJ, Rudkin ST, Ashley J, et al. Outpatient pulmonary rehabilitation in severe chronic obstructive pulmonary disease. *J R Coll Physicians Lond* 1997; 31:541–545
- 21 Eiser N, West C, Evans S, et al. Effects of psychotherapy in moderately severe COPD: a pilot study. *Eur Respir J* 1997; 10:1581–1584
- 22 Bosley CM, Corden ZM, Rees PJ, et al. Psychological factors associated with use of home nebulized therapy for COPD. *Eur Respir J* 1996; 9:2346–2350
- 23 Jones PW, Baveystock CM, Littlejohns P. Relationships between general health measured with the sickness impact profile and respiratory symptoms, physiological measures, and mood in patients with chronic airflow limitation. *Am Rev Respir Dis* 1989; 140:1538–1543
- 24 Ries AL, Kaplan RM, Limberg TM, et al. Effects of pulmonary rehabilitation on physiologic and psychosocial outcomes in patients with chronic obstructive pulmonary disease. *Ann Intern Med* 1995; 122:823–832
- 25 Karajgi B, Rifkin A, Doddi S, et al. The prevalence of anxiety disorders in patients with chronic obstructive pulmonary disease. *Am J Psychiatry* 1990; 147:200–201
- 26 Gudmundsson G, Gislason T, Janson C, et al. Depression, anxiety and health status after hospitalisation for COPD: a multicentre study in the Nordic countries. *Respir Med* 2006; 100:87–93
- 27 Yohannes AM. Depression and COPD in older people: a review and discussion. *Br J Community Nurs* 2005; 10: 42–46
- 28 Andenaes R, Kalfoss MH, Wahl A. Psychological distress and quality of life in hospitalized patients with chronic obstructive pulmonary disease. *J Adv Nurs* 2004; 46:523–530
- 29 Andenaes R, Kalfoss MH. Psychological distress in hospitalized patients with chronic obstructive pulmonary disease. *Eur J Epidemiol* 2004; 19:851–859
- 30 Dowson C, Laing R, Barraclough R, et al. The use of the Hospital Anxiety and Depression Scale (HADS) in patients with chronic obstructive pulmonary disease: a pilot study. *N Z Med J* 2001; 114:447–449
- 31 Yellowlees PM, Alpers JH, Bowden JJ, et al. Psychiatric morbidity in patients with chronic airflow obstruction. *Med J Aust* 1987; 146:305–307
- 32 Solano JP, Gomes B, Higginson IJ. A comparison of symptom prevalence in far advanced cancer, AIDS, heart disease, chronic obstructive pulmonary disease and renal disease. *J Pain Symptom Manage* 2006; 31:58–69
- 33 Kim HF, Kunik ME, Molinari VA, et al. Functional impairment in COPD patients: the impact of anxiety and depression. *Psychosomatics* 2000; 41:465–471
- 34 Yohannes AM, Baldwin RC, Connolly MJ. Prevalence of sub-threshold depression in elderly patients with chronic obstructive pulmonary disease. *Int J Geriatr Psychiatry* 2003; 18:412–416
- 35 Cully JA, Graham DP, Stanley MA, et al. Quality of life in patients with chronic obstructive pulmonary disease and comorbid anxiety or depression. *Psychosomatics* 2006; 47: 312–319
- 36 Yohannes AM, Baldwin RC, Connolly MJ. Predictors of 1-year mortality in patients discharged from hospital following acute exacerbation of chronic obstructive pulmonary disease. *Age Ageing* 2005; 34:491–496
- 37 Ciechanowski PS, Katon WJ, Russo JE. Depression and diabetes: impact of depressive symptoms on adherence, function, and costs. *Arch Intern Med* 2000; 160:3278–3285
- 38 Sullivan M, Simon G, Spertus J, et al. Depression-related costs in heart failure care. *Arch Intern Med* 2002; 162:1860–1866
- 39 Ciechanowski P, Sullivan M, Jensen M, et al. The relationship of attachment style to depression, catastrophizing and health care utilization in patients with chronic pain. *Pain* 2003; 104:627–637
- 40 Unutzer J, Patrick DL, Simon G, et al. Depressive symptoms and the cost of health services in HMO patients aged 65 years and older: a 4-year prospective study. *JAMA* 1997; 277:1618–1623
- 41 Lustman PJ, Anderson RJ, Freedland KE, et al. Depression and poor glycemic control: a meta-analytic review of the literature. *Diabetes Care* 2000; 23:934–942
- 42 de Groot M, Anderson R, Freedland KE, et al. Association of depression and diabetes complications: a meta-analysis. *Psychosom Med* 2001; 63:619–630
- 43 Black SA, Markides KS, Ray LA. Depression predicts increased incidence of adverse health outcomes in older Mexican Americans with type 2 diabetes. *Diabetes Care* 2003; 26:2822–2828
- 44 Barefoot JC, Schroll M. Symptoms of depression, acute myocardial infarction, and total mortality in a community sample. *Circulation* 1996; 93:1976–1980
- 45 Kaufmann MW, Fitzgibbons JP, Sussman EJ, et al. Relation between myocardial infarction, depression, hostility, and death. *Am Heart J* 1999; 138:549–554

- 46 Jiang W, Alexander J, Christopher E, et al. Relationship of depression to increased risk of mortality and rehospitalization in patients with congestive heart failure. *Arch Intern Med* 2001; 161:1849–1856
- 47 DiMatteo MR, Lepper HS, Croghan TW. Depression is a risk factor for noncompliance with medical treatment: meta-analysis of the effects of anxiety and depression on patient adherence. *Arch Intern Med* 2000; 160:2101–2107
- 48 Katon WJ. The Institute of Medicine “Chasm” report: implications for depression collaborative care models. *Gen Hosp Psychiatry* 2003; 25:222–229
- 49 Lin EH, Katon W, Von KM, et al. Relationship of depression and diabetes self-care, medication adherence, and preventive care. *Diabetes Care* 2004; 27:2154–2160
- 50 Blumenthal JA, Williams RS, Wallace AG, et al. Physiological and psychological variables predict compliance to prescribed exercise therapy in patients recovering from myocardial infarction. *Psychosom Med* 1982; 44:519–527
- 51 Marcus MD, Wing RR, Guare J, et al. Lifetime prevalence of major depression and its effect on treatment outcome in obese type II diabetic patients. *Diabetes Care* 1992; 15:253–255
- 52 Borson S, Claypoole K, McDonald GJ. Depression and chronic obstructive pulmonary disease: treatment trials. *Semin Clin Neuropsychiatry* 1998; 3:115–130
- 53 Borson S, McDonald GJ, Gayle T, et al. Improvement in mood, physical symptoms, and function with nortriptyline for depression in patients with chronic obstructive pulmonary disease. *Psychosomatics* 1992; 33:190–201
- 54 Caruso LB, Silliman RA, Demissie S, et al. What can we do to improve physical function in older persons with type 2 diabetes? *J Gerontol A Biol Sci Med Sci* 2000; 55:M372–M377
- 55 Sullivan MD, LaCroix AZ, Spertus JA, et al. Five-year prospective study of the effects of anxiety and depression in patients with coronary artery disease. *Am J Cardiol* 2000; 86:1135–1138, A6, A9
- 56 Von KM, Katon W, Rutter C, et al. Effect on disability outcomes of a depression relapse prevention program. *Psychosom Med* 2003; 65:938–943
- 57 Felker B, Katon W, Hedrick SC, et al. The association between depressive symptoms and health status in patients with chronic pulmonary disease. *Gen Hosp Psychiatry* 2001; 23:56–61
- 58 Stapleton RD, Nielsen EL, Engelberg RA, et al. Association of depression and life-sustaining treatment preferences in patients with COPD. *Chest* 2005; 127:328–334
- 59 Fan VS, Curtis JR, Tu SP, et al. Using quality of life to predict hospitalization and mortality in patients with obstructive lung diseases. *Chest* 2002; 122:429–436
- 60 Gudmundsson G, Gislason T, Janson C, et al. Risk factors for rehospitalisation in COPD: role of health status, anxiety and depression. *Eur Respir J* 2005; 26:414–419
- 61 Almagro P, Calbo E, Ochoa de EA, et al. Mortality after hospitalization for COPD. *Chest* 2002; 121:1441–1448
- 62 Fan VS, Ramsey SD, Giardino ND, et al. Sex, depression, and risk of hospitalization and mortality in chronic obstructive pulmonary disease. *Arch Intern Med* 2007; 167:2345–2353
- 63 Screening for depression: recommendations and rationale. *Ann Intern Med* 2002; 136:760–764
- 64 Gilbody S, House AO, Sheldon TA. Screening and case finding instruments for depression. *Cochrane Database Syst Rev* 2005; CD002792
- 65 Kunik ME, Azzam PN, Soucek J, et al. A practical screening tool for anxiety and depression in patients with chronic breathing disorders. *Psychosomatics* 2007; 48:16–21
- 66 Spitzer RL, Williams JB, Kroenke K, et al. Utility of a new procedure for diagnosing mental disorders in primary care: the PRIME-MD 1000 study. *JAMA* 1994; 272:1749–1756
- 67 Kroenke K, Spitzer RL, Williams JB. The PHQ-9: validity of a brief depression severity measure. *J Gen Intern Med* 2001; 16:606–613
- 68 Weissman MM, Sholomskas D, Pottenger M, et al. Assessing depressive symptoms in five psychiatric populations: a validation study. *Am J Epidemiol* 1977; 106:203–214
- 69 Yesavage JA, Brink TL, Rose TL, et al. Development and validation of a geriatric depression screening scale: a preliminary report. *J Psychiatr Res* 1982; 17:37–49
- 70 Zung WW. A self-rating depression scale. *Arch Gen Psychiatry* 1965; 12:63–70
- 71 Zigmond AS, Snaith RP. The hospital anxiety and depression scale. *Acta Psychiatr Scand* 1983; 67:361–370
- 72 Lovibond PF, Lovibond SH. The structure of negative emotional states: comparison of the Depression Anxiety Stress Scales (DASS) with the Beck Depression and Anxiety Inventories. *Behav Res Ther* 1995; 33:335–343
- 73 Beck AT, Ward CH, Mendelson M, et al. An inventory for measuring depression. *Arch Gen Psychiatry* 1961; 4:561–571
- 74 Katon W, Von KM, Lin E, et al. Rethinking practitioner roles in chronic illness: the specialist, primary care physician, and the practice nurse. *Gen Hosp Psychiatry* 2001; 23:138–144
- 75 Hajiro T, Nishimura K, Tsukino M, et al. Comparison of discriminative properties among disease-specific questionnaires for measuring health-related quality of life in patients with chronic obstructive pulmonary disease. *Am J Respir Crit Care Med* 1998; 157:785–790
- 76 van Ede L, Yzermans CJ, Brouwer HJ. Prevalence of depression in patients with chronic obstructive pulmonary disease: a systematic review. *Thorax* 1999; 54:688–692
- 77 Pincus HA, Hough L, Houtsinger JK, et al. Emerging models of depression care: multi-level (‘6 P’) strategies. *Int J Methods Psychiatr Res* 2003; 12:54–63
- 78 Bachman J, Pincus HA, Houtsinger JK, et al. Funding mechanisms for depression care management: opportunities and challenges. *Gen Hosp Psychiatry* 2006; 28:278–288
- 79 Koenig HG. Predictors of depression outcomes in medical inpatients with chronic pulmonary disease. *Am J Geriatr Psychiatry* 2006; 14:939–948
- 80 Silvertooth EJ, Doraiswamy PM, Clary GL, et al. Citalopram and quality of life in lung transplant recipients. *Psychosomatics* 2004; 45:271–272
- 81 Yohannes AM, Connolly MJ, Baldwin RC. A feasibility study of antidepressant drug therapy in depressed elderly patients with chronic obstructive pulmonary disease. *Int J Geriatr Psychiatry* 2001; 16:451–454
- 82 Kraus CA, Kunik ME, Stanley MA. Use of cognitive behavioral therapy in late-life psychiatric disorders. *Geriatrics* 2007; 62:21–26
- 83 Kunik ME, Veazey C, Cully JA, et al. COPD education and cognitive behavioral therapy group treatment for clinically significant symptoms of depression and anxiety in COPD patients: a randomized controlled trial. *Psychol Med*. 2007; 1–12
- 84 Simon GE. Evidence review: efficacy and effectiveness of antidepressant treatment in primary care. *Gen Hosp Psychiatry* 2002; 24:213–224
- 85 Gilbody S, Bower P, Fletcher J, et al. Collaborative care for depression: a cumulative meta-analysis and review of longer-term outcomes. *Arch Intern Med* 2006; 166:2314–2321
- 86 Lowe B, Kroenke K, Herzog W, et al. Measuring depression outcome with a brief self-report instrument: sensitivity to change of the Patient Health Questionnaire (PHQ-9). *J Affect Disord* 2004; 81:61–66

- 87 Unutzer J, Katon W, Callahan CM, et al. Collaborative care management of late-life depression in the primary care setting: a randomized controlled trial. *JAMA* 2002; 288: 2836–2845
- 88 Smoller JW, Pollack MH, Otto MW, et al. Panic anxiety, dyspnea, and respiratory disease: theoretical and clinical considerations. *Am J Respir Crit Care Med* 1996; 154:6–17
- 89 Nici L, Donner C, Wouters E, et al. American Thoracic Society/European Respiratory Society statement on pulmonary rehabilitation. *Am J Respir Crit Care Med* 2006; 173:1390–1413
- 90 Guyatt GH, Berman LB, Townsend M, et al. A measure of quality of life for clinical trials in chronic lung disease. *Thorax* 1987; 42:773–778
- 91 Jones PW, Quirk FH, Baveystock CM, et al. A self-complete measure of health status for chronic airflow limitation: the St. George's Respiratory Questionnaire. *Am Rev Respir Dis* 1992; 145:1321–1327
- 92 Mulrow CD, Williams JW Jr, Gerety MB, et al. Case-finding instruments for depression in primary care settings. *Ann Intern Med* 1995; 122:913–921
- 93 Hynninen KM, Breivte MH, Wiborg AB, et al. Psychological characteristics of patients with chronic obstructive pulmonary disease: a review. *J Psychosom Res* 2005; 59:429–443
- 94 O'Donnell DE, Fluge T, Gerken F, et al. Effects of tiotropium on lung hyperinflation, dyspnoea and exercise tolerance in COPD. *Eur Respir J* 2004; 23:832–840
- 95 Goldstein RS, Gort EH, Stubbing D, et al. Randomised controlled trial of respiratory rehabilitation. *Lancet* 1994; 344:1394–1397
- 96 Emery CF, Schein RL, Hauck ER, et al. Psychological and cognitive outcomes of a randomized trial of exercise among patients with chronic obstructive pulmonary disease. *Health Psychol* 1998; 17:232–240
- 97 Griffiths TL, Burr ML, Campbell IA, et al. Results at 1 year of outpatient multidisciplinary pulmonary rehabilitation: a randomised controlled trial. *Lancet* 2000; 355:362–368
- 98 Guell R, Resqueti V, Sengenis M, et al. Impact of pulmonary rehabilitation on psychosocial morbidity in patients with severe COPD. *Chest* 2006; 129:899–904
- 99 Lorig KR, Sobel DS, Stewart AL, et al. Evidence suggesting that a chronic disease self-management program can improve health status while reducing hospitalization: a randomized trial. *Med Care* 1999; 37:5–14
- 100 Emery CF, Shermer RL, Hauck ER, et al. Cognitive and psychological outcomes of exercise in a 1-year follow-up study of patients with chronic obstructive pulmonary disease. *Health Psychol* 2003; 22:598–604
- 101 Kozora E, Tran ZV, Make B. Neurobehavioral improvement after brief rehabilitation in patients with chronic obstructive pulmonary disease. *J Cardiopulm Rehabil* 2002; 22:426–430
- 102 Garuti G, Cilione C, Dell'Orso D, et al. Impact of comprehensive pulmonary rehabilitation on anxiety and depression in hospitalized COPD patients. *Monaldi Arch Chest Dis* 2003; 59:56–61
- 103 de Godoy DV, de Godoy RF. A randomized controlled trial of the effect of psychotherapy on anxiety and depression in chronic obstructive pulmonary disease. *Arch Phys Med Rehabil* 2003; 84:1154–1157
- 104 Alexopoulos GS, Sirey JA, Raue PJ, et al. Outcomes of depressed patients undergoing inpatient pulmonary rehabilitation. *Am J Geriatr Psychiatry* 2006; 14:466–475
- 105 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

Anxiety and Depression in COPD

Janet Maurer, Venkata Rebbapragada, Soo Borson, Roger Goldstein, Mark E. Kunik, Abebaw M. Yohannes and Nicola A. Hanania

Chest 2008;134; 43S-56S
DOI 10.1378/chest.08-0342

This information is current as of May 4, 2009

Updated Information & Services	Updated Information and services, including high-resolution figures, can be found at: http://www.chestjournal.org/content/134/4_suppl/43S.full.html
References	This article cites 103 articles, 49 of which can be accessed free at: http://www.chestjournal.org/content/134/4_suppl/43S.full.html#ref-list-1
Open Access	Freely available online through CHEST open access option
Permissions & Licensing	Information about reproducing this article in parts (figures, tables) or in its entirety can be found online at: http://www.chestjournal.org/site/misc/reprints.xhtml
Reprints	Information about ordering reprints can be found online: http://www.chestjournal.org/site/misc/reprints.xhtml
Email alerting service	Receive free email alerts when new articles cite this article. sign up in the box at the top right corner of the online article.
Images in PowerPoint format	Figures that appear in CHEST articles can be downloaded for teaching purposes in PowerPoint slide format. See any online article figure for directions.

A M E R I C A N C O L L E G E O F



P H Y S I C I A N S[®]