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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<sup>®</sup>

# Surprisingly High Prevalence of Anxiety and Depression in Chronic Breathing Disorders\*

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**Study objectives:** The objectives of this study were to assess the prevalence, screening, and recognition of depression and anxiety in persons with chronic breathing disorders, including COPD.

**Design:** Cross-sectional study.

**Setting:** The Michael E. DeBakey Veterans Affairs Medical Center (MEDVAMC).

**Participants:** A large sample of 1,334 persons with chronic breathing disorder diagnoses who received care at the MEDVAMC.

**Measurements:** The prevalence of anxiety and depression was measured in a large sample of persons with a chronic breathing disorder diagnosis who received care at the MEDVAMC, using the Primary Care Evaluation of Mental Disorders (PRIME-MD) screening questions. The positive predictive value of the PRIME-MD questions was then determined. The prevalence of anxiety and depressive diagnoses in patients determined to have COPD was then measured, using the Structured Clinical Interview for the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition* (SCID).

**Results:** Of patients screened with the PRIME-MD, 80% screened positive for depression, anxiety, or both. The predictive value of a positive phone screen for either depression or anxiety was estimated to be 80%. In the subsample of patients who had COPD and received a diagnosis using the SCID, 65% received an anxiety and/or depressive disorder diagnosis. Of those patients, only 31% were receiving treatment for depression and/or anxiety.

**Conclusions:** It is troubling that a mere 31% of COPD patients with depression or anxiety are being treated, particularly given their high prevalence in this population. Practical screening instruments may help increase the recognition of anxiety and depression in medical patients, as suggested by the excellent positive predictive value of the PRIME-MD in our study.

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**Key words:** anxiety; anxiety disorders; depression; depressive disorder; lung diseases, obstructive; prevalence; pulmonary disease, chronic obstructive

**Abbreviations:** BAI = Beck Anxiety Inventory; BDI = Beck Depression Inventory; ICD-IX = *International Classification of Diseases, Ninth Revision*; MEDVAMC = Michael E. DeBakey Veterans Affairs Medical Center; PRIME-MD = Primary Care Evaluation of Mental Disorders; SCID = Structured Clinical Interview for the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition*; VA = Veterans Affairs

Chronic respiratory conditions occur in > 10% of adults in the United States.<sup>1</sup> These conditions lead to impairments in activities of daily living, social functioning, psychological functioning, and recreational activities. The presence of depression or anxiety compounds the emotional and physical effects of breathing disorders.<sup>2–5</sup> Although some studies<sup>6–9</sup> have examined the prevalence of depression and anxiety symptomatology in clinical settings, no studies have examined the screening, prevalence, and treatment of depression and anxiety of persons with chronic breathing disorders who are not actively seeking health care.

Of chronic respiratory conditions, COPD has received the most attention to psychological parameters. Depression has been found to occur in 7 to 42% of persons with COPD,<sup>10</sup> up to four times more frequently than it occurs in persons without COPD. Multiple studies, covering a variety of medical settings, have found greater prevalence of depression in patients with COPD than in control subjects. Yellowlees et al<sup>6</sup> studied 50 consecutive patients with COPD on an inpatient respiratory unit, and using the *Diagnostic and Statistical Manual of Mental Disorders, Third Edition* criteria, found that 34% had an anxiety disorder and 16% had depression.

Using the Hospital Anxiety and Depression Scale at hospital admission, Dowson et al<sup>7</sup> found anxiety in 50% and depression in 28% of 72 patients with COPD hospitalized for cardiorespiratory rehabilitation.

A few studies have examined the joint occurrence of depression and anxiety in COPD patients. Light et al<sup>8</sup> showed a correlation ( $r = 0.81$ ) between anxiety and depression symptomatology in COPD, using the State-Trait Anxiety Inventory and the Beck Depression Inventory (BDI) in 77 pulmonary clinic patients. In primary care outpatients with COPD, Yohannes et al<sup>9</sup> found that 37% of patients with depressive symptoms had comorbid anxiety symptoms. No studies to date have examined the prevalence of depression or anxiety, or their comorbidity, in persons with COPD outside of the clinic or inpatient setting.

Although depression and anxiety occur frequently in persons with chronic lung diseases and other chronic medical illnesses, depression is recognized in < 50% of depressed patients.<sup>11,12</sup> The United States Preventive Services Task Force<sup>13</sup> recommends screening for depression in primary care. The United States Preventive Services Task Force<sup>13</sup> and others<sup>12,14,15</sup> also suggest the use of brief screening instruments, such as the two-item depression screening questions from the Primary Care Evaluation of Mental Disorders (PRIME-MD).<sup>16</sup> No prior studies have employed short screening instruments to detect depression and anxiety in patients with chronic lung disease. However, the two-question depression module and the three-question anxiety module of the PRIME-MD have been validated for diagnosing anxiety and depressive disorders in otorhinolaryngology outpatients with dizziness.<sup>17</sup> Our study examines the utility of telephone screening with the anxiety

and depression modules of the PRIME-MD in patients with chronic lung disease.

This article presents a cross-sectional assessment of depression and anxiety in persons with chronic breathing disorders, including COPD, across three different screening steps. First, the prevalence of anxiety and depression and their joint occurrence, according to screening with the PRIME-MD, are examined within a large random sample of persons with chronic breathing disorders. Subsequently, the positive predictive value of the PRIME-MD questions for identifying clinically significant depression and anxiety according to self-report is described among patients with chronic breathing disorders. Finally, we describe the recognition, prevalence, and treatment of anxiety and depressive diagnoses in patients with COPD, the most common chronic lung disease.

## MATERIALS AND METHODS

This study was conducted as part of a randomized controlled trial to test the use of cognitive behavioral therapy in persons with COPD and comorbid anxiety and/or depression. All research was in accordance with the recommendations found in the Helsinki Declaration of 1975, and all research subjects participated in informed consent procedures approved by the Baylor College of Medicine Institutional Review Board. The study was conducted in three separate screening phases.

### *Prevalence in Persons With Chronic Breathing Disorders*

All persons who received care at the Michael E. DeBakey Veterans Affairs Medical Center (MEDVAMC) in the previous year and had a chronic breathing disorder diagnosis were targeted for recruitment. The sample was drawn by searching the 2002–2003 Veterans Affairs (VA) outpatient clinic files and patient treatment files at the Austin Automation Center for patients seen at the MEDVAMC with one or more of the following *International Classification of Diseases, Ninth Revision* (ICD-IX) codes: bronchitis (ICD-IX 466, 490, and 491), emphysema (ICD-IX 492), asthma (ICD-IX 493), bronchiectasis (ICD-IX 494), chronic airway obstruction (ICD-IX 496), and respiratory condition not otherwise specified (ICD-IX 508). Patients were drawn randomly from this list and were then sent a letter from their primary care physician, informing them that a member of the study team would be calling to discuss participation in the study. Next, patients who received a letter and could be contacted by telephone were prescreened for acknowledgment of a breathing disorder. Those who did acknowledge a breathing disorder were also screened for anxiety and depression at that time, using the anxiety and depression screening questions from the PRIME-MD patient questionnaire.<sup>18</sup> The PRIME-MD consists of five modules (somatoform disorder, mood disorder, anxiety disorder, eating disorder, and alcohol disorder) to assess categorical psychiatric diagnoses according to the diagnostic criteria of the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition*.<sup>19</sup> A positive screen for depression or anxiety is a positive response to at least one of the two depression questions or one of the three anxiety questions, respectively. Patients who prescreened positive were asked to make an appointment for a baseline assessment.

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### Positive Predictive Value of Screening in Persons with Chronic Breathing Disorders

At the baseline appointment, level of depression was assessed using the BDI-II<sup>20</sup> and level of anxiety was assessed using the Beck Anxiety Inventory (BAI).<sup>21</sup> Clinically significant levels of depression and anxiety were defined by a score  $\geq 14$  on the BDI<sup>20</sup> and a score  $\geq 16$  on the BAI,<sup>21-24</sup> respectively. These cut points were used to establish the positive predictive value of the telephone screening questions for the detection of depression, anxiety, or both. Also, Cochran-Armitage tests for trend in the rates of positive phone screens were performed over four ordered-score range categories for the BDI (0 to 13, 14 to 19, 20 to 28, and 29 to 63) and the BAI (0 to 7, 8 to 15, 16 to 25, 26 to 63). If clinically significant levels of depression or anxiety were present, portable spirometry was administered to confirm COPD ( $FEV_1/FVC < 75\%$  and  $FEV_1 < 70\%$ ), and a Mini Mental State Examination was administered to ensure adequate cognitive functioning (Mini Mental State Examination  $\geq 24$ ).

### Recognition and Treatment of Anxiety and Depression in Persons with COPD

Finally, participants with significant depression and/or anxiety and confirmed COPD were interviewed with the Structured Clinical Interview for the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition* (SCID)<sup>25</sup> to identify the presence of psychotic disorders or substance use disorders. If no psychotic disorders or substance use disorders were diagnosed, the remaining sections of the SCID were administered to diagnose anxiety and/or mood disorders. The presence of treatment was determined by the following: (1) asking the patients to identify if they were receiving treatment for anxiety or depression, and (2) use of an antidepressant or anxiolytic medication, as identified through self-report and use of VA electronic records. The presence of a diagnosis of depression or anxiety was established by searching the patient treatment files and outpatient clinic files for the following ICD-IX codes: 296.xx, 300.xx, 301.xx, 309.xx, and 311, during the 3 years prior to their baseline screening.

## RESULTS

### Prevalence in Persons With Chronic Breathing Disorders

Recruitment letters were sent to 5,969 VA patients with a chronic breathing disorder diagnosis, and 3,146 of those patients were telephoned (2,823 were

not yet telephoned). To date, 1,573 of 3,146 VA patients (50%) completed the prescreening telephone assessment (1,573 refused telephone screening). Of these, 1,334 patients acknowledged a breathing problem and were subsequently screened for depression and anxiety with the PRIME-MD. Of the 1,334, 862 patients (65%) screened positive for both depression and anxiety, 133 patients (10%) screened positive for anxiety only, and 72 patients (5%) screened positive for depression only. Overall, 267 patients (20%) screened negative for both anxiety and depression. The 1,067 who screened positive for anxiety and/or depression were eligible for continued evaluation. Demographics of the group undergoing the PRIME-MD ( $n = 1,334$ ), the group undergoing the BAI/BDI ( $n = 557$ ), and the group undergoing the SCID ( $n = 204$ ) are presented in Table 1.

### Symptom Severity in Persons With Chronic Breathing Disorders

Of the 1,067 patients eligible through telephone prescreening, 557 patients (52%) have come in to date and completed the BAI and/or BDI at the baseline screen. In this sample, 444 patients (80%) were found to have clinically significant levels of depression and/or anxiety according to the BDI and/or BAI. Therefore, the predictive value of a positive phone screen according to the PRIME-MD for either depression or anxiety was 80% among those who completed the BAI and/or BDI.

If one were to estimate the effect of nonresponse by considering a full range of possible BAI/BDI results for the 48% of the population who screened positive on the PRIME-MD but did not come in, the positive predictive value of the telephone screening would be between 42% and 90%.<sup>26</sup> The product of the 80% who screened positive on the PRIME-MD questions and the predictive probability of 42 to 90% of the PRIME-MD yields an estimated prevalence of depression or anxiety among VA patients with breathing problems of 34 to 72%. These percentages

**Table 1—Demographic Characteristics of Patients Screened for Depression and Anxiety\***

Characteristics	PRIME-MD Screen (n = 1,334)	BAI/BDI Screen (n = 557)	SCID Screen (n = 204)
Male gender	1,243 (93.2)	522 (93.7)	196 (96.1)
Mean age (SD), yr	64.2 (11.9)	63.8 (11.6)	65.9 (10.7)
White	811 (60.8)	366 (65.7)	164 (80.4)
African American	320 (24)	144 (25.9)	31 (15.2)
Hispanic	57 (4.3)	38 (6.8)	5 (2.4)
Native American	2 (0.2)	7 (1.3)	4 (2.0)
Missing	144 (10.8)	2 (0.3)	0 (0)

\*Data are presented as No. (%) unless otherwise indicated.

apply to patients seen at the MEDVAMC who agreed to be interviewed about breathing problems, anxiety, and depression.

Positive predictive values for one and two positive depression screening questions were 77.4% and 85.2%, respectively. The positive predictive values for one, two, and three positive anxiety screening questions were 65.7%, 72.4%, and 87.3%, respectively. The Cochran-Armitage trend test for both depression and anxiety (two ways of dichotomizing PRIME-MD results for depression and three ways for anxiety) indicated statistically significant trends ( $p$  values  $< 0.0001$ ); a higher number of positive PRIME-MD screens was associated with increased severity in the corresponding Beck inventory score in each case.

Of the 444 depressed and/or anxious patients, 88 patients (20%) met criteria for depression only ( $BDI \geq 14$ ), 47 patients (10%) met criteria for anxiety only ( $BAI \geq 16$ ), and 309 patients (70%) met criteria for both anxiety and depression. Of those with depression and/or anxiety ( $n = 444$ ), 230 patients (52%) had severe levels of depression and/or anxiety.<sup>20,21</sup> All levels of anxiety and depression severity according to the BAI and BDI are presented in Table 2.

#### SCID Diagnoses in Persons With COPD

Of these 444 patients who met criteria for clinically significant anxiety and/or depression, 240 patients did not receive a diagnosis with the full SCID for the following reasons: no COPD ( $n = 194$ ), severely depressed and/or suicidal ( $n = 12$ ), active psychosis ( $n = 9$ ), cognitive impairment ( $n = 8$ ), active substance use disorders ( $n = 9$ ), and other ( $n = 8$ ). Thus, 204 patients underwent SCID testing for specific anxiety and/or depressive disorders. In total, 132 patients (65%) received an anxiety and/or depressive disorder diagnosis, 77 patients (39%) received a depressive disorder diagnosis, and 101 patients (51%) had an anxiety disorder. The diagnosis-

tic criteria for both a depressive illness and an anxiety disorder were met by 53 patients (26%). Table 3 presents the overall prevalence of anxiety and depression SCID diagnoses, and Table 4 presents the prevalence of specific SCID anxiety and depression diagnoses.

Of the 204 patients with clinically significant anxiety and/or depression and confirmed COPD, 63 patients (31%) were receiving treatment for depression and/or anxiety. Only 40 patients (20%) were receiving an antidepressant or anxiolytic medication. Of the 91 patients who had severe levels of depression or anxiety according to the BAI/BDI, 42 patients (46%) were receiving treatment for depression and/or anxiety, and 28 patients (31%) were receiving an antidepressant or anxiolytic agent. The administrative record search revealed that only 33 of 77 patients (43%) with a SCID diagnosis of depression had received a clinical diagnosis by their physicians, and only 29 of 100 patients (29%) with SCID-diagnosed anxiety disorder had received a clinical diagnosis by the physician.

#### DISCUSSION

In this cross-sectional study of anxiety and depression in patients with chronic breathing disorders, we found a surprisingly high prevalence of anxiety and depression using the PRIME-MD (80%). Eighty percent of those who screened positive by the PRIME-MD also met criteria for depression and/or anxiety with the Beck anxiety and depression inventories. Even when the full range of potential impact of nonresponse was considered, a sizable proportion (34 to 72%) of the patients with chronic breathing disorders had anxiety and/or depression, and the positive predictive value of the screening was between 42% and 90%. Our study was less likely to have patients with acute pulmonary disease than prior studies, indicating that the relatively high prevalence of depression and anxiety was not due to pulmonary disease acute exacerbation. There are several reasons why the prevalence of anxiety and depression might have been elevated in our study vs

**Table 2—Severity of Depression and Anxiety Found in Patients Screened With the BDI and the BAI**

Variables	No. (%)
BDI severity ( $n = 557$ )	
Minimal (0–13)	156 (28.0)
Mild (14–19)	121 (21.7)
Moderate (20–28)	147 (26.4)
Severe (29–63)	133 (23.9)
BAI severity ( $n = 556$ )	
Minimal (0–7)	59 (10.6)
Mild (8–15)	140 (25.2)
Moderate (16–25)	173 (31.1)
Severe (28–63)	184 (33.1)

**Table 3—Prevalence of Anxiety and Depressive Spectrum Disorders, as Defined by SCID Testing, Among COPD Patients With Anxious and/or Depressive Symptoms**

SCID Diagnostic Categories	No. (%)
Depressive disorder only	24 (12)
Anxiety disorder only	48 (23)
Co-occurring depressive and anxiety disorder	53 (26)
No SCID diagnosis	79 (39)

**Table 4—Percentages of Patients With Depressive and Anxious SCID Diagnoses (n = 204)**

Variables	No. (%)
Depressive disorders	
Major depressive disorder	47 (23)
Dysthymia	29 (14)
Depressive disorder not otherwise specified	1 (0.5)
Any SCID depressive diagnosis	77 (38)
Anxiety disorders	
Generalized anxiety disorder	39 (19)
Specific phobia	27 (13)
Anxiety disorder not otherwise specified	24 (12)
Posttraumatic stress disorder	15 (7)
Panic without agoraphobia	10 (5)
Social phobia	3 (1.5)
Panic with agoraphobia	2 (1)
Obsessive compulsive disorder	2 (1)
Any SCID anxiety diagnosis	101 (50)
One or more SCID diagnosis	125 (64.7)
No SCID diagnosis	79 (35.3)

other studies. Our patients were prescreened by telephone, and patients lacking any indication of anxiety or depression were not eligible for study participation, which would presumably result in selection of a population with elevated anxiety and depression for further screening. Prevalence of depressive and anxiety disorders is higher in VA beneficiaries, as compared to national samples.<sup>27,28</sup> Also, VA beneficiaries are known to have greater disease burden (both physical and mental) than the general population.<sup>27</sup> However, one study<sup>29</sup> that screened a VA outpatient population for depression found a prevalence of 31%, suggesting that our results may indeed be indicative of an elevated prevalence of depression in VA patients with breathing problems.

In addition to a generally high prevalence of individual symptoms, our data also show that an elevated number of patients have both anxious and depressive symptoms. Several risk factors for depression and anxiety are common in persons with breathing disorders, including functional limitations, feeling less control of life circumstances, and serious life events.<sup>30</sup> Zung et al,<sup>31</sup> using self-rated depression and anxiety scales in a VA medical setting, found a prevalence of depression of 13%, accompanied by comorbid anxiety 67% of the time. Our finding of 61% of patients with comorbid anxiety and depression is also similar to community samples of older adults,<sup>30</sup> and to other studies of geriatric samples.<sup>32</sup>

Our results show that health-care providers are recognizing < 40% of anxiety or depressive disorders in COPD patients. It is troubling that a mere 30% of patients with depression or anxiety are being treated, and that only a slightly higher percentage of those with severe anxiety and/or depression are being

treated. Our data also suggest that despite treatment, many patients still meet criteria for a depressive and/or anxiety spectrum illness.

Barriers to recognition and treatment exist at the patient, provider, and system levels. At the patient level, stigma may lead patients with anxiety and depression to exaggerate somatic complaints instead of acknowledging emotional problems. At the provider level, stereotypes and lack of interest/time may be barriers. At the system level, the poor integration of care for mental health into primary care settings may be an obstacle.<sup>33</sup>

Cognitive behavioral therapy, psychopharmacology,<sup>34</sup> and pulmonary rehabilitation<sup>35,36</sup> all appear to be promising treatments<sup>37</sup> for depression and anxiety in persons with COPD. Unfortunately, lack of treatment for anxiety and depression in COPD seems to be the rule rather than the exception, based on data from the few published studies. In a study<sup>38</sup> of 43 patients with COPD, < 25% of those with depression or anxiety were receiving any treatment. In two different series<sup>6,39</sup> of COPD patients with substantial depression and anxiety, none of the patients were found to be seeing a psychiatrist. Other studies have demonstrated that pharmacotherapy is not utilized in the majority of COPD patients with anxiety or depression.<sup>7,9</sup>

This study is limited in that it is an all-veteran, mostly male sample, lacks BAI/BDI data for individuals who screened negative on the PRIME-MD questions, has BAI/BDI data on only 52% of eligible participants, and has SCID diagnoses for only a screened sample of persons with COPD. However, the study has unique strengths, including its large size, inclusion of SCID-based diagnosis for a subsample, and use of a nonclinic, noninpatient sampling frame. No other study has screened such a large number of patients with chronic breathing disorders. By sampling patients outside of a clinic-based or inpatient setting, we have examined a group that is likely more representative of patients with chronic breathing disorders and COPD in general.

The high degree of comorbidity and the low level of recognition and treatment calls into question recent studies<sup>40–43</sup> that only target depressive disorders. A great need exists for research to guide the assessment and treatment of anxiety and mixed anxiety-depression in primary care settings, particularly in populations that are older and have chronic medical illnesses.<sup>23,44,45</sup> Furthermore, given that most patients in our study had mixed anxiety and depression, the unidimensional and exclusive diagnostic criteria of the *Diagnostic and Statistical Manual of Mental Disorders* may have limited value in patients with chronic breathing disorders.<sup>46</sup>

Practical screening instruments may be one mech-

anism by which to increase the recognition of anxiety and depression in medical patients. Based on the high prevalence of anxiety and depression we observed in patients with chronic breathing disorders who screened positive to at least one of the PRIME-MD questions, the conditional probability of a patient who screens positive having significant anxiety and/or depression is high. The five questions comprising the anxiety and mood modules of the Patient Health Questionnaire had very good positive predictive value in our sample. Other studies<sup>17,47</sup> in medical populations have further validated the use of these five screening questions. Research suggests that primary care providers find screening tools that go beyond depression helpful in diagnosing the psychological distress that often occurs in primary care patients.<sup>32</sup> Studies<sup>41,42</sup> have combined such case-finding strategies with the use of case managers to improve the recognition and treatment of depression. Our findings indicate that such collaborative approaches should be broadened to include anxiety disorders and mixed anxiety-depression disorders.

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