13 COPD’s Effects on Psychosocial Functioning and Familial Interactions

Key Points
1. COPD profoundly affects patients’ psychosocial functions and these adverse effects may deleteriously affect a patient’s perception and response to COPD’s respiratory manifestations.
2. The prevalence of depression, anxiety, and panic disorders is markedly increased in individuals with COPD.
3. Depression and anxiety are associated with increased healthcare utilization and morbidity and mortality.
4. Panic disorders may impair patients’ ability to react to and treat acute exacerbations of COPD.
5. Cognitive dysfunction may impair the ability to use or adhere with respiratory treatments, daily function, and interpersonal relationships.
6. The familial and social networks of patients with COPD are frequently reduced and interpersonal relationships are strained, causing stress for all parties.
7. Pulmonary rehabilitation reduces anxiety and depression associated with COPD.

13.1 Introduction

COPD is associated with psychosocial disorders including depression, anxiety, panic attacks, and cognitive impairment as well as alterations in interpersonal relationships (Fan, 2014). These psychological comorbidities may worsen the underlying disease, alter the perception of respiratory symptoms, and may affect self-management of COPD (DeJean, 2013). Cognitive impairment may affect a patient’s ability to understand or remember medications or appointments. Changes in social interactions may lead to social isolation, spousal or familial conflict, and may affect psychological manifestations of COPD. Although profound psychosocial alterations may accompany COPD, these processes have only recently been comprehensively studied and optimal approaches to treatment are still under evaluation.

13.2 Depression

Depression is an altered mood characterized by a loss of interest or pleasure in life’s activities (American Psychiatric Association, 2013). The Diagnostic and Statistical Manual (DSM) IV criteria for major depression are presented in Table 13.1. Measures of depression in patients with COPD include the Beck Depression Inventory, the Center
Table 13.1: DSM-IV Criteria for Major Depressive Disorder (APA, 2013)

<table>
<thead>
<tr>
<th>Criteria for Major Depressive Disorder</th>
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<tbody>
<tr>
<td>Depressed mood or a loss of interest or pleasure in daily activities for more than two weeks.</td>
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<tr>
<td>- Mood represents a change from the person’s baseline.</td>
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<td>- Impaired function: social, occupational, educational.</td>
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<td>- Specific symptoms, at least 5 of these 9, present nearly every day:</td>
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<tr>
<td>1. <strong>Depressed mood or irritable</strong> most of the day, nearly every day, as indicated by either subjective report (e.g. feels sad or empty) or observation made by others (e.g. appears tearful).</td>
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<tr>
<td>2. <strong>Decreased interest or pleasure</strong> in most activities, most of each day</td>
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<tr>
<td>3. <strong>Significant weight change (5%) or change in appetite</strong></td>
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<td>4. <strong>Change in sleep</strong>: Insomnia or hypersomnia</td>
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<td>5. <strong>Change in activity</strong>: Psychomotor agitation or retardation</td>
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<td>6. <strong>Fatigue or loss of energy</strong></td>
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<tr>
<td>7. <strong>Guilt/worthlessness</strong>: Feelings of worthlessness or excessive or inappropriate guilt</td>
</tr>
<tr>
<td>8. <strong>Concentration</strong>: Diminished ability to think or concentrate, or more indecisiveness</td>
</tr>
<tr>
<td>9. <strong>Suicidality</strong>: Thoughts of death or suicide, or has suicide plan</td>
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for Epidemiological Studies Depression Inventory, the Patient Health Questionnaire Depression Scale, and the Hospital Anxiety and Depression Scale (Beck, 1978; Radloff, 1977; Kroenke, 2001; Zigmond, 1983).

### 13.2.1 Prevalence

The prevalence of depression among individuals with COPD ranges from 7–88% and depends upon the sample population of patients with COPD, airflow limitation severity, and the diagnostic tool(s) used to define depression (Yohannes, 2010; Hynninen, 2005; Putman-Casdorph, 2009). COPD increases the risk of concurrent depression, relative risk (RR) 1.69 [95% confidence interval (CI) 1.45–1.96] and depression increases the risk of mortality in those with COPD, RR 1.83 [95% CI 1.00–3.36] (Atlantis, 2013). A meta-analysis revealed an odds ratio (OR) of 2.8 for depression among individuals with COPD compared with healthy controls (Zhang, 2011). A 2013 meta-analysis of 6 studies showed that COPD is associated with an increased risk of depression, RR 1.69 [95% CI 1.45-1.96] (Atlantis, 2013).

Only one third of patients with COPD and high depression scores have been diagnosed with treatment relevant depression and only 22% have been treated (Hanania, 2011). The estimated annual care cost for patients with COPD and associated depression or anxiety is $28,961 versus $22,512 for COPD alone (Dalal, 2011).

A review of 38,010 patients with a new diagnosis of COPD from 2000–2004 compared with matched controls in Taiwan demonstrated that incident depression was 1.88 fold greater in those with COPD (12.2 versus 6.47 per 1000 person years) and
that the diagnosis of depression was greatest in the year after COPD diagnosis and declined thereafter (Tsai, 2013). Younger women, lower socioeconomic status, hospitalization, and comorbidities (hypertension, arthritis, cancer, and cardiovascular disease) were associated with an increased diagnosis of depression (Tsai, 2013).

In another group of 245 patients with COPD, 17.6% had depression defined by a Centers for Epidemiologic Studies Depression (CES-D) scale of 24 or higher and the presence of depression increased with the BODE quartile but did not correlate with COPD severity measured by GOLD stage (Kim, 2014). The level of education was inversely correlated with the prevalence of depression (Kim, 2014).

In a group of 307 patients with COPD, 12.4% had anxiety, 9.1% had depression, and 16.3% had both anxiety and depression measured by the Hospital Anxiety and Depression Scale (HADS) (Hilmarsen, 2014). Anxiety and depression scores correlated with COPD Assessment Test (CAT) scores, a disease-specific health status survey, but not with updated GOLD scores (Hilmarsen, 2014). In contrast, others have found a higher prevalence of anxiety and depression in patients with former GOLD stage IV compared with stages I and II (Janssen, 2010) and among patients with greater respiratory symptoms (updated GOLD groups B and D) (Lee, 2013).

13.2.2 Manifestations

Manifestations of depression in patients with COPD include poor self-reported health status, feelings of hopelessness and pessimism, poor sleep quality and quantity (see Chapter 11, COPD and Sleep), reduced appetite, concentration, and social interactions, fatigue, and lassitude (Felker, 2001; Emery, 2008). Depression may be associated with increased somatization and heightened awareness and sensitivity to respiratory symptoms. Depression and activities of daily living appear to be more important determinants of quality of life than severity of airflow impairment (Yohannes, 1998). Functional impairment, disability, and health status are worse for depressed patients with COPD compared with those who do not have depression and functional capacity may be more highly correlated with depression than severity of pulmonary physiologic impairment (Graydon, 1995; Yohannes, 1998; Yohannes, 2005; Felker, 2001; Kim, 2000). Individuals with COPD and depression are less likely to utilize self-management strategies or healthy behaviors such as smoking cessation compared with those who are not depressed (Stapleton, 2005; Dowson, 2004; Wagena, 2004).

Higher anxiety and depression levels are associated with greater fatigue, breathlessness, and frequency of respiratory symptoms among patients with COPD (Doyle, 2013). Depression, along with poor health status and COPD severity, is a key predictor of reduced physical activity (a key prognostic indicator in COPD) measured by walking less than 30 minutes daily (Miravitlles, 2014). In contrast, others have shown that depression is associated with poorer quality of life but not reduced activities of daily living (Weldam, 2013). A meta-analysis of studies evaluating depression and
quality of life among individuals with COPD and airflow limitation confirmed by spirometry showed that depression significantly correlated with health related quality of life, pooled $r=0.48$, 95% CI 0.37–0.57 (Blakemore, 2014).

Individuals with COPD have twice the prevalence of insomnia (adjusted odds ratio (aOR), 2.4) compared with the general population and nearly half (48.1%) of individuals with COPD have insomnia (Ohayon, 2014). Most individuals with COPD and depression (84.4%) or anxiety (59.7%) had associated insomnia symptoms (Ohayon, 2014). Co-occurrence of insomnia and depression or anxiety was associated with a five-fold increase of hospitalization for COPD and a reduced quality of life (Ohayon, 2014).

13.2.3 Mortality

Depression is a risk factor for mortality in individuals with COPD (Atlantis, 2013; Yohannes, 2005; de Voogd, 2009). A meta-analysis of 16 studies following 28,759 individuals with COPD for 1 to 8 years showed that depression was associated with increased mortality, RR 1.43 [95% CI, 1.00–3.36] (Atlantis, 2013). Among 100 patients hospitalized for acute exacerbations of COPD, 56% had depression, and depression was associated with an increased one year mortality, OR 1.13 [95% CI, 1.02–1.26] (Yohannes, 2005). Depression was associated with a greater mortality, OR 1.93 [95% CI, 1.12–3.33], among 121 patients with COPD who completed inpatient pulmonary rehabilitation and were followed for 8.5 years (de Voogd, 2009).

13.2.4 Healthcare Utilization

Anxiety and depression are significant factors associated with admissions and readmissions for COPD exacerbations. Other factors include: reduced quality of life, COPD severity, female sex, lower BODE scores, persistent smoking, increased breathlessness, hypercapnea, hypoxemia, long term oxygen use, sense of loss, inability to cope, decrease in self-efficacy, poor adherence to therapy, lower socioeconomic status, and prior COPD exacerbations (Pooler, 2014). Depression may reduce an individual’s motivation to seek assistance either medically or socially.

A 2012 meta-analysis of nine prospective studies showed that, among individuals with COPD, the number of exacerbations requiring hospitalization was increased in those with concurrent depression (RR 1.12, 95% CI 1.02–1.24) and both anxiety and depression (RR 1.18, 95% CI 1.01–1.38) but not with anxiety alone (RR 1.05, 95% CI 0.92–1.19) (Laurin, 2012). A subsequent 2013 meta-analysis of 13 studies showed that anxiety or depression were associated with an increased risk of adverse COPD-related outcomes (RR 1.43, 95% CI 1.22–1.68) and that depression increased the risk of mortality (RR 1.83, 95% CI 1.00–3.36) (Atlantis, 2013).
Anxiety and depression are associated with activation of the hypothalamic-pituitary-adrenal axis and increased systemic inflammation (Cameron, 2004; Ehlert, 2001; Bremmer, 2008; Joynt, 2004). Anxiety and depression are also associated with low self-confidence or self-efficacy which may detrimentally affect a number of health care activities including physical activity, medication adherence, smoking cessation, healthful nutrition, and pulmonary rehabilitation engagement (Laurin, 2012).

13.2.5 Management

Increased disease knowledge, self-efficacy, and better perceived social support are associated with fewer depressive symptoms in individuals with COPD (Lee, 2013). Problem-oriented coping strategies that focus on eliminating the source of the stress or learning how to best cope with the stressor may translate into a better understanding of COPD into less depressive symptoms and may provide a mechanism of intervention to alleviate psychological symptoms of COPD (Lee, 2013). Controlled breathing techniques (relaxation exercises, pursed-lip breathing, and active expiration) taught by respiratory therapists may reduce breathlessness, anxiety, and depression in patients hospitalized with COPD exacerbations (Valenza, 2014). Systemic review of randomized controlled trials of psychological and or lifestyle interventions for individuals with COPD showed that exercise training was the only intervention associated with significant treatment effects for depression and anxiety (Coventry, 2013).

13.2.5.1 Pharmacologic Treatment

Antidepressants have not been shown to induce remission of depression or to reduce respiratory symptoms in individuals with COPD (Yohannes, 2014). A review of pharmacologic treatment of depression in COPD analyzed six studies of selective serotonin reuptake inhibitors and four trials of tricyclic antidepressants and concluded that there is no conclusive evidence for the efficacy of any antidepressant in this patient population (Yohannes, 2014). In a retrospective analysis of 17,320 Medicare beneficiaries with COPD, 86.8% of those with concurrent depression were receiving antidepressant treatment, and treatment was associated with lower mortality, hazard ratio (HR) 0.55 [99% CI, 0.44–0.68] (Qian, 2013). Further studies are required to determine the efficacy and optimal class of antidepressant for the management of depression in individuals with COPD.

13.2.5.2 Pulmonary Rehabilitation

Pulmonary rehabilitation reduces levels of anxiety and depression for individuals with all levels of COPD severity (Tselebis, 2013; Emery, 1998; Griffiths, 2000; Guell, 2006; Guell, 2006; Withers, 1999; Hui, 2003). Individuals who do not complete pul-
Pulmonary rehabilitation have higher rates of depression and somatization measured by the SCL-90 compared with those who complete rehabilitation (Tselebis, 2014). Pulmonary rehabilitation participants with anxiety and or depression are 10 fold more likely not to achieve the minimal clinically important difference improvement in breathlessness (Hornikx, 2013).

### 13.3 Anxiety

Anxiety is an apprehensive anticipation of danger or stressful situations associated with increased nervousness or worry (APA, 2013). The DSM-IV criteria for the diagnosis of Generalized Anxiety Disorder are presented in Table 13.2. Anxiety disorders associated with COPD include generalized anxiety disorder (6–33%), panic disorder (with or without agoraphobia) (0–41%), specific phobia (10–27%), and social phobia (5–11%) (Willgoss, 2013). The Anxiety Inventory for Respiratory Disease (AIR) is a COPD-specific nonsomatic anxiety scale that can be used to screen for and measure anxiety in individuals with COPD and correlates well with the Hospital Anxiety and Depression-Anxiety subscale (Willgoss, 2013). Other anxiety measures include the Beck Anxiety Inventory, the State-Trait Anxiety Inventory, and the Hospital Anxiety and Depression Scale (Beck, 1988; Spielberger, 1970; Zigmond, 1983). Surveys that include screens for somatic complaints such as shortness of breath and tiredness tend to overestimate the prevalence of anxiety among individuals with COPD because of the overlap of symptoms between anxiety and COPD (Mikkelsen, 2004).

<table>
<thead>
<tr>
<th>Table 13.2: DSM-IV Criteria for the Diagnosis of Generalized Anxiety Disorder (APA, 2013)</th>
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<tbody>
<tr>
<td><strong>Criteria for Generalized Anxiety</strong></td>
</tr>
<tr>
<td>– At least 6 months of “excessive anxiety and worry” about a variety of events and situations. Generally, “excessive” can be interpreted as more than would be expected for a particular situation or event. Most people become anxious over certain things, but the intensity of the anxiety typically corresponds to the situation.</td>
</tr>
<tr>
<td>– There is significant difficulty in controlling the anxiety and worry. If someone has a very difficult struggle to regain control, relax, or cope with the anxiety and worry, then this requirement is met.</td>
</tr>
<tr>
<td>– The presence for most days over the previous six months of 3 or more (only 1 for children) of the following symptoms:</td>
</tr>
<tr>
<td>1. Feeling wound-up, tense, or restless</td>
</tr>
<tr>
<td>2. Easily becoming fatigued or worn-out</td>
</tr>
<tr>
<td>3. Concentration problems</td>
</tr>
<tr>
<td>4. Irritability</td>
</tr>
<tr>
<td>5. Significant tension in muscles</td>
</tr>
<tr>
<td>6. Difficulty with sleep</td>
</tr>
<tr>
<td>– The symptoms are not part of another mental disorder.</td>
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</tbody>
</table>
13.3.1 Prevalence

The reported prevalence of anxiety among individuals with COPD ranges widely from 2–100% and depends upon the sample population of patients with COPD, airflow limitation severity, and the diagnostic tool(s) used to define anxiety (Brenes, 2003; Mikkelsen, 2004; Yohannes, 2010; Hynninen, 2005; Putman-Casdorph, 2009). The prevalence of anxiety ranges from 10–55% in hospitalized patients to 13–46% among outpatients with COPD and is greater among women than men (Willgoss, 2013).

Anxiety is related to depression in individuals with COPD; 37% of those patients with COPD and depression have anxiety, whereas only 5% of nondepressed individuals have anxiety (Yohannes, 2000). In a study of 45 Veterans with COPD, anxiety and depression scores were highly correlated and all participants with mild or moderate anxiety also had depression (Light, 1985). Greater use of catastrophic coping strategies, higher levels of negative social support, and lower levels of symptom self-management are associated with greater anxiety among men with COPD whereas higher levels of positive social support are associated with less anxiety (McCartie, 2002). Anxiety levels are associated with greater social isolation (Lustig, 1972). A meta-analysis of studies evaluating anxiety and quality of life among individuals with COPD and airflow limitation confirmed by spirometry showed that anxiety significantly correlated with health related quality of life, pooled r=0.36, 95% CI 0.23–0.48 (Blakemore, 2014).

Anxiety levels in individuals with COPD are higher in women than men, current smokers than nonsmokers, and those with marital dissatisfaction (Ashmore, 2005; Gudmundsson, 2006). Most, but not all, studies suggest that anxiety levels do not correlate with levels of resting or exertional breathlessness, airflow limitation severity, or other pulmonary physiologic impairments (Garuti, 2003; Gudmundsson, 2006; Hajiro, 2000; Wagen, 2005; Engstrom, 1996; Dowson, 2001). The relationship between breathlessness and anxiety is unclear but Bailey has proposed a “dyspnea-anxiety-dyspnea” cycle that suggests that anxiety does not cause breathlessness but is a sign of dyspnea (Bailey, 2004).

Levels of anxiety do not correlate with pulmonary physiology or 12 minute walking tests (Light, 1985). Anxious individuals experience more symptoms of nicotine withdrawal upon smoking cessation and, therefore, may have a higher predilection to nicotine addiction due to increased difficulty in stopping smoking (Breslau, 1992; Hill, 2008).

In patients presenting to the emergency department with respiratory exacerbations of asthma or COPD, the presence of anxiety and or depression correlated with hospitalization and relapse within 30 days (Dahlen, 2002). Among patients hospitalized with a COPD exacerbation, greater anxiety is associated with a higher risk of rehospitalization within 12 months, HR 1.07, 95% CI 1.03–1.11, per 4 unit increase in the hospital anxiety and depression scale (Gudmundsson, 2005). In contrast, a study of 43 Veterans showed that anxiety and depression were associated with poor func-
tional status but not with inpatient or outpatient healthcare utilization (Kim, 2000). Poor emotional functioning measured by the chronic respiratory questionnaire portends higher mortality in women with COPD who live alone and are prescribed long-term oxygen (Crockett, 2002).

13.3.2 Manifestations

Manifestations of anxiety in patients with COPD include muscle tension, breathlessness, chronic worry, palpitations, feeling on edge, nausea, numbness, and fear of losing control (Emery, 2008). Anxiety correlates with quality of life in patients with COPD (Brenes, 2003). Many individuals with COPD and anxiety experience panic attacks (see Panic Attack section below).

13.3.3 Management of Anxiety

13.3.3.1 Pharmacotherapy

Two trials of buspirone, a serotonin receptor agonist, yielded mixed results, whereas citalopram, a selective serotonin reuptake inhibitor, was not effective in treating anxiety in patients with COPD (Argyropoulou, 1993; Singh, 1993; Silvertooth, 2004). Nortriptyline, a tricyclic antidepressant, effectively reduced both anxiety and depression (Borson, 1992). Due to a paucity of studies, a 2011 Cochrane analysis was not able to determine whether pharmacological treatment of anxiety disorders in individuals with COPD was effective (Usmani, 2011).

13.3.3.2 Nonpharmacotherapy

Psychotherapy has yielded mixed results for the treatment of anxiety in pulmonary rehabilitation programs (Lustig, 1972; de Godoy, 2003; Renfroe, 1988). A systemic meta-analysis of psychologically based interventions for the psychological manifestations of COPD showed benefit that was limited to anxiety (Baraniak, 2011). A qualitative study of 14 individuals with COPD and self-reported symptoms of anxiety revealed intense thoughts of fear, hopelessness, and confusion that were associated with anxiety and panic attacks and ameliorated with self-talk coping strategies (Willgoss, 2012). Progressive muscle relaxation techniques do not reduce anxiety in patients with COPD (Renfroe, 1988; Gift, 1992; Sassi-Dambron, 1995). Participation in comprehensive pulmonary rehabilitation reduces anxiety in patients with COPD (Emery, 1991; Griffiths, 2000; Guell, 2006; Kayahan, 2006; Emery, 1998).
Panic attack is defined as a brief period of intense fear or discomfort in which four or more of these 13 symptoms develop abruptly and reach a peak within 10 minutes:  
1. Palpitations, pounding heart, or accelerated heart rate  
2. Sweating  
3. Trembling or shaking  
4. Sensations of shortness of breath or smothering  
5. Feeling of choking  
6. Chest pain or discomfort  
7. Nausea or abdominal distress  
8. Feeling dizzy, unsteady, lightheaded, or faint  
9. Derealization (feelings of unreality) or depersonalization (being detached from oneself)  
10. Fear of losing control or going crazy  
11. Fear of dying  
12. Paresthesias (numbness of tingling sensations)  
13. Chills or hot flushes

Table 13.3: DSM-IV Criteria for Panic Attack (APA, 2013)

<table>
<thead>
<tr>
<th>Criteria for Panic Attack</th>
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<tbody>
<tr>
<td>A brief period of intense fear or discomfort in which four or more of these 13 symptoms develop abruptly and reach a peak within 10 minutes:</td>
</tr>
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<td>10. Fear of losing control or going crazy</td>
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<td>12. Paresthesias (numbness of tingling sensations)</td>
</tr>
<tr>
<td>13. Chills or hot flushes</td>
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</tbody>
</table>

13.4 Panic Attacks

Panic attack is defined as a brief period of intense fear or discomfort in which four or more of 13 symptoms (listed in Table 13.3) develop abruptly and reach a peak within 10 minutes (Craske, 2010).

Panic disorder is defined as recurrent panic attacks, at least one of which has been followed by one month of any or all of persistent concern about having additional attacks or their consequences; worry about the implications of the attack or its consequences or a significant change in behavior related to the attacks; the panic attacks are not due to the direct physiological effects of a substance or a general medical condition; the panic attacks are not better accounted for by another mental disorder (Craske, 2010). In individuals with COPD, panic disorder can only be diagnosed when the panic attacks are not cued by internal stressors such as respiratory infections triggering COPD exacerbations or by external stressors such as exertion (Livermore, 2010).

13.4.1 Prevalence

Depending upon the population of COPD patients sampled and the method and threshold for defining and identifying panic attacks and panic disorder, between 6.5 and 67% of patients with COPD have a diagnosis of panic disorder (Weaver, 1997; Kim, 2000; Patten, 2007; Hallas, 2009; Kunik, 2005; Pollack, 1996; Livermore, 2010).
In a study of hospitalized patients with COPD, 73% of those with an anxiety disorder had panic disorder with agoraphobia (Voegele, 2008). Conversely, the lifetime prevalence of respiratory disorders is greater in patients with panic disorder (47%) compared with those with obsessive-compulsive disorder (13%) or eating disorders (13%) (Zanderbergen, 1991) and more patients with panic disorders have respiratory diseases, especially bronchitis, than those with other anxiety disorders, 42.7 versus 16.2% (Verburg, 1995A). Over 12 months, 63% of individuals with COPD experience at least one panic attack and, when surveyed, 37–51% have had a panic attack in the prior 3–4 weeks (Porzelius, 1992; Howard, 2009). Elderly women with COPD report more panic attacks than those without COPD, OR 4.13 [95% CI, 2.65–6.43] (Smoller, 2003). A large European telephone survey of 10,854 adults reported an adjusted odds ratio of 7.1 for panic disorder among those with COPD compared with those who did not have COPD (Ohayon, 2014). Predictors of panic-spectrum psychopathology in individuals with COPD include more severe depressive symptoms, greater catastrophic interpretations of shortness of breath, greater anxiety sensitivity, and degree of recent life stressors, and lower FEV\textsubscript{1} (Livermore, 2012).

Individuals with COPD and panic disorder have a heightened sensation of breathlessness during inspiratory load testing compared with age-matched individuals with similar levels of airflow limitation and COPD (Livermore, 2008; Giardino, 2010). This increased sensation of dyspnea appears to be due to heightened emotional responses to breathlessness rather than increased interoceptive sensitivity (Giardino, 2010). Patients with panic disorder experience a greater increase in subjective anxiety when exposed to 35% CO\textsubscript{2} than individuals with generalized anxiety disorder (Verburg, 1995B).

Individuals with COPD and panic disorder have more frequent and longer respiratory hospital admissions (Yellowlees, 1987; Gudmundsson, 2005) and greater disability and impaired function (Kim, 2000) than those without panic disorder. COPD self-management may be impaired in individuals with panic disorders (Dowson, 2004).

13.4.2 Treatment of Panic Disorder

Although cognitive behavioral therapy (CBT) has been demonstrated to be effective management of panic disorder in individuals who do not have COPD, its efficacy in those with COPD is less clear (Barrera, 2014; Livermore, 2010). Several studies have shown that CBT may reduce both panic attacks and respiratory hospitalizations in patients with COPD, but these studies have used different therapeutic presentations (group versus individual sessions), concurrent education and or exercise sessions, and varying durations of therapy and follow up (Livermore, 2010; Kunik, 2001; Kunik, 2007; de Godoy, 2003; Emery, 1998).

Benzodiazepines are effective treatments for panic attacks and panic disorder; however, they should be used cautiously in patients with COPD due to the potential
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to blunt respiratory drive and to cause or worsen hypercapnea (Smoller, 1996). Other pharmacologic treatments for panic disorders in individuals with COPD include selective serotonin reuptake inhibitors and tricyclic antidepressants (Smoller, 1996).

13.5 Cognitive Impairment

Neuropsychological impairment may occur in individuals with COPD, especially those with hypoxemia (Dodd, 2010; Klein, 2010). The optimal screening test for cognitive function in individuals with COPD has not been determined. A study of the validity of the Mini-Mental State Examination (MMSE) and the Montreal Cognitive Assessment (MoCA) compared with a comprehensive neuropsychologic assessment in individuals with COPD showed that the MMSE did not have an acceptable cutoff and the optimal MoCA cutoff was 26 (Villeneuve, 2012).

13.5.1 Prevalence

The prevalence of cognitive dysfunction among individuals with COPD ranges from 10.4–48.5% depending upon the population studied and the methods used to detect cognitive impairment (Antonelli-Inc, 2006; Incalzi, 1993; Villeneuve, 2012; Schou, 2012). The prevalence of mild cognitive impairment among patients with moderate to severe COPD is 36% compared with 12% among healthy controls and the major impairment was nonamnestic mild cognitive impairment with attention and executive dysfunctions (Villeneuve, 2012). In a survey of 27,106 nursing home residents with COPD, 62% had short-term memory impairment and 43.3% had moderately or severely impaired daily decision making cognitive skills (Zarowitz, 2012).

Cognitive function measured by the MoCA test is more impaired among patients with acute COPD exacerbations than in those with stable COPD (Crisan, 2014). Greater deficits occurred in language abstraction and attention and delayed recall and orientation than in visuospatial and naming functions. Impairment was negatively correlated with pulmonary function and positively associated with measures of inflammation and level of CO₂ (Crisan, 2014). A multivariate analysis of factors associated with cognitive impairment among individuals with stable COPD and varying levels of physiologic impairment showed that only the number of COPD exacerbations in the prior year was associated with reduced cognitive function measured by an array of standardized neuropsychological tests (Tulek, 2014).

A longitudinal study of elderly individuals showed that COPD increased the risk for nonamnestic mild cognitive impairment (NA-MCI) by 83% and that those individuals with a diagnosis of COPD for more than 5 years had the greatest risk for NA-MCI, HR 1.58 [95% CI, 1.04–2.40] (Singh, 2013; Singh, 2014). In the Cardiovascular Risk Factors, Aging, and Dementia study, a population-based longitudinal study with
25 years of follow-up, midlife COPD was associated with an increased risk for mild cognitive impairment, HR 1.85 [95% CI, 1.05–3.28] (Rusanen, 2013).

When cognitive function is measured among individuals hospitalized for acute exacerbations of COPD, 57% have impaired function, and 20% have a pathologic loss in processing speed and there was no improvement 3 months after recovery (Dodd, 2013). Cognitive function in patients with acute on chronic respiratory failure requiring mechanical ventilation is worse at hospital discharge compared with healthy controls but improves to comparable levels within six months (Ambrosino, 2002). Cognitive impairment was associated with worse quality of life measured by the St. George’s Respiratory Questionnaire and longer length of hospital stay (Dodd, 2013). Among the 432 individuals with COPD in the Cardiovascular Health Study, co-existing COPD and cognitive impairment were associated with increased respiratory-related, aHR 4.10 [95% CI, 1.86–9.05], and all cause hospitalizations, aHR 1.34 [95% CI, 1.00–1.80] and death, aHR 2.29 [95% CI, 1.18–4.45] (Chang, 2012). Impaired performance on the copy with landmark test is associated with an increased mortality risk in individuals with severe COPD (Antonelli-Incalzi, 2006).

In patients with hypoxemic respiratory failure treated with supplemental oxygen, worse physiologic function measured by severity of airflow obstruction may predict those individuals who will experience cognitive decline (Incalzi, 1998). Poor adherence to medications is associated with impaired verbal memory measured by the delayed recall test (Incalzi, 1997).

13.5.2 Manifestations

Cognitive impairment may be associated with effects on day-to-day function in individuals with COPD. Driving simulation testing demonstrates increased accident frequency among individuals with COPD compared with healthy controls (Orth, 2008). Activities of daily living including self-administration of medications, continence, fiscal responsibility, and dressing correlate better with cognitive function than with lung physiologic function in individuals with COPD (Antonelli-Incalzi, 2008). Further, impaired cognitive function correlates with inability to perform technically acceptable pulmonary function testing (Allen, 2008).

Hippocampal atrophy measured by magnetic resonance imaging is associated with cognitive dysfunction and chronic hypoxemia in individuals with COPD (Li, 2013). Serum S100B levels correlate with cognitive impairment in COPD and may be a useful biomarker (Li, 2013). Among individuals with COPD, hypoxemia, SpO₂<88%, correlates with greater cognitive impairment, OR 5.45 (95% CI, 1.014–29.2) and the use of supplemental oxygen decreases the risk, OR 0.14 (95% CI, 0.07–0.27) (Thakur, 2010). Short term reduction of the SpO₂ to 85% by reduction of the inspired oxygen concentration in patients with COPD does not affect cognitive function measured by multiple tests suggesting that chronic rather than transient oxygen desaturation may
be critical in the development of cognitive impairment (Martin, 2011). Similarly, acute oxygen treatment does not improve neuropsychological test performance (Vos, 1995; Wilson, 1985). Longer term supplemental oxygen has either no or minimal benefits on cognitive function (Heaton, 1983; Krop, 1973; Incalzi, 1993; Hjalmarsen, 1999; Borak, 1996; Incalzi, 1993). Chronic hypoxemia combined with hypercapnia may be significant etiologic factors in the development of cognitive impairment in individuals with COPD (Zheng, 2008). Cerebral perfusion is diminished in patients with COPD and is more reduced in those with hypoxemia than in those with normoxemia and the reduction in perfusion correlates with cognitive impairment (Ortapamuk, 2006; Antonelli-Incalzi, 2003).

### 13.5.3 Management

Pulmonary rehabilitation and exercise may improve cognitive function among individuals with COPD (Etnier, 2001; Angevaren, 2008; Emery, 2008). Acute and prolonged (10 weeks) exercise improves performance on the Verbal Fluency test (Emery, 2001; Emery, 1998). Individuals who maintain an exercise regimen after pulmonary rehabilitation sustain improvements in cognitive and psychological function, whereas those who stop exercising lose the benefits of rehabilitation (Emery, 2003). Lung volume reduction surgery may be associated with six month improvements in visuomotor speed that are not sustained one or two years after surgery (Kozora, 2008; Kozora, 2011). Cognitive training is not effective in improving cognitive function in individuals with COPD (Incalzi, 2008).

### 13.6 Social Interactions

The effect of COPD on social interactions has only recently been investigated. In older individuals, negative social interactions have greater effects than positive interactions (Newsom, 2005). Perceived negative social support is associated with higher levels of anxiety and depression among patients with COPD, whereas positive social support correlates with less anxiety and depression (McCathie, 2002). Individuals with COPD often experience a shrinking social network and nearly one third of Veterans with COPD felt social and familial isolation due to respiratory limitations on activities and concern for developing respiratory symptoms or distress with activities or interactions (Panos, 2013). Individuals with COPD who are homebound have increased risk of hospitalization during the winter in the United Kingdom (Jordan, 2008) and those with reduced social support have a 50% increased risk of hospital admissions for COPD (Partridge, 2011). Patients with COPD who are single have an 18% higher admission rate for COPD exacerbations than those individuals with a supporting spouse (Wong, 2008). Socio-economic deprivation measured by the Scot-
tish Index of Multiple Deprivation (a weighted index of seven domains: employment, income, crime, housing, health, education, and access) correlates with the frequency of hospital admissions for COPD (McAllister, 2013). Negative social support, perceived insensitive and unsympathetic responses by social network members and perception that their social network let them down when needed, and receipt of instrumental support, receiving aid or assistance from others, are associated with greater anxiety among patients with COPD. Negative social support may foster fears of social isolation and rejection whereas instrumental support may realize an individual’s needs and dependence upon others (DiNicola, 2013).

A higher perceived level of social support correlates with better overall functioning in depressed elderly with COPD (Marino, 2008). Positively perceived social support is associated with fewer hospitalizations and COPD exacerbations, improved quality of life, and increased self-efficacy for including participation in health promoting activities such as smoking cessation and physical activity (Harris, 2007; Lee, 1991; Murray, 1995).

13.7 Effect of COPD on Caregivers

Until recently, the effect of COPD on caregivers has not been fully examined, interventions to improve COPD management have largely ignored nonhealthcare providers, and economic analyses of COPD’s costs usually do not include care provided by family or others (Caress, 2009). Nearly two thirds (63.5%) of caregivers have anxiety, 34% have depression, and 27.1% have both anxiety and depression (Jacome, 2014). Perceived burden and limitation on activities, female gender, and older age were significant predictors of caregivers’ anxiety and depression (Jacome, 2014).

The number of tasks that a caregiver must supervise for an individual with COPD correlates with symptoms of depression, anxiety, interpersonal sensitivity, hostility, stress, and psychotropic medication use (Cossette, 1993). Increasing emotional support caused the greatest stress on caregivers (Cossette, 1993). The burden felt by caregivers of individuals with COPD was greater among younger caregivers and did not correlate with gender, education, perceived financial capability, or employment status (Cain, 2000). In interviews of women caring for husbands with COPD, Bergs (Bergs, 2002) found that the women were dissatisfied with their recreation, lack of support from other family members, friends, and the healthcare system; they desired more information and support from healthcare providers, recognition of their caring role, and opportunities for respite care. Less positive and more negative dyadic coping (methods of dealing with stress within a couple) are associated with greater psychological stress including anxiety and depression and lower quality of life, and the higher the patient perceived the imbalance in delegated dyadic coping, the lower the couple’s quality of life (Meier, 2011). Patient marital adjustment is associated with patient well-being and partner marital adjustment is associated with patient physical
Patients with poor marital adjustment experience greater improvements in psychological functioning after pulmonary rehabilitation than those with better marital adjustment (Ashmore, 2005). Qualitative studies of the effect of COPD on family members identified several themes: restriction in family social life, emotional distress related to COPD exacerbations, tension in couple relationships, financial strain, and coping resources (Gabriel, 2014).

Caregivers of individuals with more advanced COPD have greater subjective burden, more symptoms of depression, and worse self-rated mental health than those caring for individuals with less severe COPD; the subjective burden increased with COPD severity, depression and anxiety comorbidities, caregiver hours per week, and self-rated mental health (Fiqueiredo, 2014). As an individual with COPD’s respiratory status declines, caregiver tasks change, their relationship with the patient evolves, and they modify their expectations (Philip, 2014).

The interactions or perceptions of interactions between caregivers and individuals with COPD may affect the anxiety level. Individuals with COPD have greater anxiety levels if they perceive more insensitive and unsympathetic responses or feel that they are not supported when they need assistance or have greater anxiety levels (DiNicola, 2013). Both patients with COPD and their spouses have high and clinically significant levels of anxiety and depression and spouses who perceive patients to have higher levels of breathlessness report greater distress (Al-Gamal, 2014). They often feel powerless to relieve the breathlessness and suffering experienced by the patient (Booth, 2003; Seamark, 2004).

13.8 Conclusion

COPD is increasingly being recognized as a systemic process that affects the entire person, not only physiologically but also psychosocially. The psychological manifestations of COPD may severely affect the perception and reaction to respiratory symptoms leading to increased healthcare utilization and morbidity and mortality from COPD. The social and familial networks of individuals with COPD are often reduced and interpersonal relationships strained. Identification and management of the psychosocial manifestations of COPD is increasingly being recognized and optimal treatments are being studied.

13.9 Summary Points

1. The prevalence of depression among individuals with COPD ranges from 7–88%.
   - Depression may be associated with increased somatization and heightened awareness and sensitivity to respiratory symptoms.
Manifestations of depression in patients with COPD include poor self-reported health status, feelings of hopelessness and pessimism, poor sleep quality and quantity, reduced appetite, concentration, and social interactions, fatigue, and lassitude. Anxiety and depression are significant factors associated with admissions and re-admissions for COPD exacerbations.

Depression may reduce an individual's motivation to seek assistance either medically or socially.

2. Anxiety occurs in 2–100% of individuals with COPD.
   - Most, but not all, studies suggest that anxiety levels do not correlate with levels of resting or exertional breathlessness, airflow limitation severity or other pulmonary physiologic impairments.
   - Manifestations of anxiety in patients with COPD include muscle tension, breathlessness, chronic worry, palpitations, feeling on edge, nausea, numbness, and fear of losing control.
   - Anxiety negatively correlates with quality of life in patients with COPD.

3. Between 6.5 and 43% of patients with COPD have a diagnosis of panic disorder.
   - Individuals with COPD and panic disorder have more frequent and longer respiratory hospital admissions than those without panic disorder, greater disability, and impaired function.
   - COPD self-management may be impaired in individuals with panic disorders.

4. The prevalence of cognitive dysfunction among individuals with COPD ranges from 10.4–48.5%.
   - Co-existing COPD and cognitive impairment is associated with increased respiratory-related and all cause hospitalizations and death.

5. The effect of COPD on social interactions has only recently been investigated.
   - Positively perceived social support is associated with fewer hospitalizations and COPD exacerbations, improved quality of life, and increased self-efficacy including participation in health promoting activities such as smoking cessation and physical activity.

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