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Epidemiology and Management of Common Pulmonary Diseases in Older Persons

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Pulmonary disease prevalence increases with age and contributes to morbidity and mortality in older patients. Dyspnea in older patients is often ascribed to multiple etiologies such as medical comorbidities and deconditioning. Common pulmonary disorders are frequently overlooked as contributors to dyspnea in older patients. In addition to negative impacts on morbidity and mortality, quality of life is reduced in older patients with uncontrolled, undertreated pulmonary symptoms. The purpose of this review is to discuss the epidemiology of common pulmonary diseases, namely pneumonia, chronic obstructive pulmonary disease, asthma, lung cancer, and idiopathic pulmonary fibrosis in older patients. We will review common clinical presentations for these diseases and highlight differences between younger and older patients. We will also briefly discuss risk factors, treatment, and mortality associated with these diseases. Finally, we will address the relationship between comorbidities, pulmonary symptoms, and quality of life in older patients with pulmonary diseases.

Key Words: Pulmonary diseases—Older persons—Dyspnea—Comorbidity—Quality of life.

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A LTHOUGH the prevalence of lung diseases has been increasing as the population ages, it is still underestimated in older persons (1–4). Dyspnea and cough are common symptoms of pulmonary diseases in older patients but are also associated with nonpulmonary comorbid conditions such as heart failure, anemia, deconditioning, and muscle weakness. We will review the incidence and prevalence of pneumonia, chronic obstructive pulmonary disease (COPD), asthma, lung cancer, and idiopathic pulmonary fibrosis (IPF) in older patients. We will then focus on specific treatment considerations in older persons as they pertain to survival, functional status, and quality of life with reference to current professional guidelines.

PNEUMONIA

Epidemiology

Community acquired pneumonia (CAP) is responsible for 350,000–620,000 hospitalizations annually in older patients (5). The incidence of CAP is 14 cases/1,000 person-years; this incidence is at least doubled in nursing home residents (6,7). Aspiration pneumonia is two to three times as prevalent in nursing home residents but is often underdiagnosed (8–10). In addition to bacterial pneumonia, viral pneumonia is also responsible for a significant proportion of hospitalizations in older patients each year (11).

Clinical Presentation and Evaluation

Older patients with CAP commonly present with tachypnea, delirium, and constitutional symptoms such as failure to thrive, malaise, and falls rather than fever, cough, and purulent sputum typically associated with bacterial pneumonia (7,8,12–15). Aspiration pneumonia in patients with baseline neurological deficits can be especially challenging to diagnose due to its slow, indolent course, low-grade fevers, and notable absence of rigors (16,17). Viral pneumonia may present with new dyspnea and bronchospasm (18). Between difficulties in obtaining adequate sputum samples and nonspecific symptoms, pneumonia diagnosis is often delayed in older patients (12,13).

Streptococcus pneumoniae is the most common cause of CAP in older patients (8,10), but polymicrobial infections are not uncommon (11,19). Different pathogens are responsible for pneumonia in residents of nursing homes,
which are commonly classified with health care–associated pneumonia. *Staphylococcus aureus* is the most common isolate from nursing home residents (11). Anaerobic organisms may play an important role in aspiration pneumonia. Reactivation of pulmonary tuberculosis should also be considered in older patients with pneumonia (8).

**Risk Factors**

Age is a risk factor for pneumonia, regardless of whether patients are home dwelling or institutionalized (20–23). Influenza infection is a risk factor for bacterial pneumonia due to bacterial colonization and overgrowth through direct damage to airway epithelial cells and impaired mucociliary clearance (24,25). In addition, there are virus-specific factors such as viral neuraminidase production that may increase host susceptibility to secondary bacterial infection (26).

Impaired host defenses may also increase risk of secondary bacterial pneumonia, including in older persons (27–29). Common comorbidities in older patients including heart failure, liver disease, and underlying lung disease are risk factors for pneumonia (28–32). Comorbid diseases leading to dysphagia and gastroesophageal reflux disease put older patients at increased risk of aspiration pneumonia. Male gender and diabetes are additional risk factors for aspiration pneumonia (33).

**Treatment**

Treatment of CAP and aspiration pneumonia in older patients should follow the Infectious Diseases Society of America/American Thoracic Society guidelines (34). Age is an important part of several different scores used to calculate pneumonia severity such as the Pneumonia Severity Index which has been validated and used to predict outcomes and need for hospitalization in patients with CAP (35). Drug-resistant pathogens need to be treated in health care–associated pneumonia and hospital-acquired pneumonia (36).

**Outcome**

Pneumonia-related mortality increases with age (5,37). Older patients who recover from pneumonia have higher mortality rates than younger patients for several years following their pneumonia (10,15,30,38). Similar to outcomes in younger patients, severity of disease and organ failure are the strongest predictors of mortality in older persons (34,35). Comorbid disease and functional status are also significant predictors for readmission and mortality in older patients with pneumonia (38–40). Male gender may also be a risk factor for pneumonia-related deaths (5) (Table 1).

**CHRONIC OBSTRUCTIVE PULMONARY DISEASE**

**Epidemiology**

COPD is the fourth leading cause of death in the United States (41) and is associated with aging (42–44) (Figure 1). At least 10% of persons aged 65 years and older in the United States are diagnosed with COPD (45). Internationally, the prevalence of COPD has been estimated between 5% and 16% in patients aged 40 years and older, depending on the country (46–53). These numbers likely underestimate the prevalence of COPD due to underdiagnosis and underutilization of pulmonary function tests (PFTs) (1–3,45,48,52–60).

Due to the nature of COPD, most studies can only estimate disease prevalence. However, a large Dutch cohort of nearly 8,000 participants found the incidence rate (IR) of COPD to be 9.2/1,000 person-years in patients greater than or equal to 55 years old, with increasing incidence through ages 75–79 years (61) (Figure 1). Overall, the IR was higher in men than women (14.4/1,000 person-years vs 6.2/1,000 person-years, respectively).

**Clinical Presentation and Evaluation**

Pulmonary symptoms of COPD are nonspecific and include cough, chronic sputum production, wheeze, and dyspnea. Chronic cough is the best single symptom to predict airway obstruction in smokers more than 60 years old (42). COPD should be considered in all patients with a history of exposure to cigarette smoke or occupational pollutants with chronic cough, sputum production, or dyspnea (62).

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**Table 1. Summary of Community Acquired Pneumonia**

<table>
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<tr>
<th>Epidemiology</th>
<th>Incidence of 14 cases/1,000 person-years*</th>
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<td>Clinical presentation and evaluation</td>
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*Incidence doubled in nursing home residents.

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Figure 1. Prevalence of COPD by age group in the United States. Data from National Health Interview Survey, 2000 (45).
Comorbidities affect more than 80% of older patients with COPD (54,63–67). Older patients may attribute their dyspnea to these other comorbid diseases (including congestive heart failure, hypertension, and neurological deficits after stroke) or to muscle weakness, deconditioning, or physiological symptoms related to aging (63,65). Older patients with COPD may use different language to describe dyspnea compared with older patients without COPD (68). Patients with COPD commonly use words like “terrifying,” “frightening,” “helpless,” “depressed,” and “awful” when describing dyspnea symptoms (68). Perhaps related to different symptomatic experiences of dyspnea, anxiety and depression are highly prevalent in older patients with advanced COPD (69–71).

PFTs are the gold standard for diagnosing COPD. Although the majority of patients can perform the test, hearing impairment, cognitive impairment, and comorbid diseases may affect older patients’ ability to complete PFTs (72,73). There is a dose–response relationship between severity of COPD (Global Initiative for Chronic Obstructive Lung Disease stage IV) and dyspnea symptoms (74). Hypoxemia and hypercapnia should not be considered physiological, unavoidable consequences of aging.

Lung function decreases with age, even among individuals without lung disease and this complicates PFT interpretation in older persons. Based on Global Initiative for Chronic Obstructive Lung Disease definitions of COPD, 35% of healthy, asymptomatic, never smokers aged 70 years and older have stage 1 COPD (75). In order to avoid excessive diagnosis of COPD in asymptomatic older persons, adjustments to current diagnostic thresholds and consideration of alternative PFT measurements have been proposed (76–78). In addition, American Thoracic Society and European Respiratory Society guidelines recommend using below the 5th percentile of the normal distribution of forced expiratory volume in one second/vital capacity as the cutoff for COPD diagnosis rather than a fixed ratio of 70% (79).

Risk Factors

Although age is a risk factor for developing COPD (42,80), tobacco smoke is the number one risk factor, regardless of age (62). Current smoking and greater than or equal to 20 pack-year smoking history are particularly strong risk factors for COPD (61). Environmental exposure to biomass smoke is also a risk factor for COPD, especially in developing countries (47,81–84). Certain occupational exposures are risk factors for COPD (84). Alpha-1 antitrypsin gene mutations contribute to 5% of patients with COPD (85). Prior tuberculosis infection has been associated with irreversible airway obstruction (48,53). Male sex may also be a risk factor for COPD although this is not consistently found (61).

Treatment

Treatment of COPD in older persons should follow the Global Initiative for Chronic Obstructive Lung Disease guidelines (41). There are no age-specific recommendations for treatment of COPD. Pharmacological therapies include inhaled beta-agonists, anticholinergics, and corticosteroids, which are prescribed alone or in combination. Treatment of COPD should follow a stepwise approach in symptomatic patients. Long-acting inhalers are recommended for patients with more advanced disease (86–90). Sustained-release theophylline is another treatment option in older patients with COPD although inhaled bronchodilators are preferred for treatment (91). The phosphodiesterase-4 inhibitor roflumilast has been shown to decrease exacerbations in randomized clinical trials (92,93). In addition, roflumilast may improve lung function when used with long-acting beta-agonists or anticholinergic inhalers (93). Although no pharmacological therapies have been shown to definitively improve lung function, pharmacotherapy may reduce symptoms and exacerbations, and improve exercise tolerance and health-related quality of life (HRQOL) (94–96).

There are toxicities associated with COPD medications (Table 2). Beta-agonists can cause tremors and tachycardia, and chronic or excessive use can result in drug tolerance. Long-acting beta-agonists should be used with caution in older persons also because of possible increased systemic inflammation and increased risk of cardiovascular events (97). Concerns exist over the cardiovascular safety profile of anticholinergic inhalers used to treat COPD (98,99). However, in a 4-year randomized controlled trial of 6,000 COPD patients, tiotropium was associated with decreased mortality, particularly from cardiac diseases (100,101).

Inhaled corticosteroids (ICS) may have a role in COPD treatment when used in combination with inhaled bronchodilators. In a retrospective cohort study of Medicare beneficiaries, health care costs due to emergency room visits and hospitalizations were decreased in older patients receiving combination fluticasone propionate/salmeterol inhalers compared to anticholinergic-only inhalers (102). Similar beneficial results were found in commercially insured COPD patients aged 40 years or older (103). Recent studies of older Veterans found less frequent use of mechanical ventilation and lower mortality in COPD patients with pneumonia who were treated with ICS (104,105).

ICS use is associated with significant side effects, particularly in older patients. Oropharyngeal candidiasis may result from local drug deposition. Systemic side effects are possible due to systemic absorption from the lungs and delivery of drug to the gastrointestinal tract. This can result in loss of bone density and may contribute to osteoporosis and fracture risk (106–111). ICS use can also cause adrenal suppression, especially with high-dose fluticasone (112–114). Older patients on high-dose ICS may have an increased risk for development of glaucoma and cataracts as well (115–117). Some studies have shown an increased risk of...
pneumonia in patients with COPD on ICS although this is not a consistent finding, and in some studies, ICS was associated with a decreased risk of pneumonia as cited earlier (118–120). ICS have been associated with an increased risk of tuberculosis (119–121). Although the risks are significant, reviewing proper inhaler technique and the use of spacer devices for some patients can minimize systemic absorption of ICS and oral candidiasis (122–125).

Theophylline is used infrequently due to its narrow therapeutic window requiring regular monitoring of serum concentrations to minimize risk of side effects including tachycardia, cardiac arrhythmias, and seizures. In one study of older patients on theophylline, there was no correlation between adverse events and serum levels in patients who reported adverse events (91).

Pulmonary rehabilitation has been studied in older patients with COPD (126). Pulmonary rehabilitation improves physical activity and ability to perform activities of daily living, with sustained benefits in older patients with COPD (126–128). In the absence of formal pulmonary rehabilitation programs, self-administered strength training may be beneficial in older COPD patients. In a small study of older, home-dwelling men with COPD, heavy resistance training improved muscle size, strength, functional performance, and self-reported health perception (129).

Older patients with acute exacerbations of chronic obstructive pulmonary disease (AECOPD) may require augmented inhaler regimens with long-acting bronchodilators, inhaled or systemic corticosteroids, and antibiotics, especially in patients with more severe exacerbations (122,130–141). Antibiotics are underprescribed in older patients with AECOPD (142). In one Dutch study, only half of patients with AECOPD aged 65 years or older received antibiotics (142). Patients with comorbid diseases such as diabetes and heart failure were more likely to receive antibiotics during AECOPD (142).

Medication nonadherence is common in COPD (143). Older patients, even in the absence of COPD, may not have enough strength to generate the negative inspiratory force required to use inhaled medications (144,145). Weakness and inappropriate technique can lead to undertreatment of COPD in older patients who are otherwise adherent to their medications (146). Alternative modes of delivery such as transdermal drug delivery may provide alternative options for older patients with COPD (147). Metered-dose or dry powder inhaler technique should be reassessed regularly.

Cost is an additional barrier to COPD medication compliance in older patients. In a recent study of Medicare beneficiaries, 31% of patients did not use inhalers due to cost (148). Risk of cost-related nonadherence was greatest for patients who paid more than $20 per month out-of-pocket (148).

Outcomes

Comorbidities are responsible for a significant proportion of deaths in older patients with COPD, particularly cardiovascular disease and lung cancer (149–151). CAP and AECOPDs are associated with higher short- and long-term mortality and negatively impact HRQOL (152).
forced expiratory volume in 1 second (FEV1) and better 6-minute walk distance are associated with improved survival (153).

The impact of COPD on functional status and HRQOL is dependent on comorbidities and severity of airway obstruction (54,63–65). In older patients with mild COPD, age and non-COPD comorbidities appear to have the greatest impact on physical independence and mortality (154). In older patients with stable COPD, the ability to perform activities of daily living and overall emotional state most affect HRQOL rather than degree of obstructive lung disease on PFTs (155). Although COPD is associated with significant morbidity and mortality, several treatments are available to assist older patients maintain or improve their functional status and HRQOL (Table 3).

### Asthma

#### Epidemiology

Asthma has a bimodal distribution with increased diagnosis in patients aged 50–65 years (156,157) (Figure 2). Asthma prevalence in patients greater than or equal to 65 years old is estimated between 4% and 8% (59,158–160). In a large cohort of older patients with asthma, more than 50% were diagnosed after the age of 50 years and 23% were diagnosed after 65 years (161). Asthma is underdiagnosed in older persons, particularly in highly functional older patients even when their PFTs demonstrate reversible airway obstruction (162,163).

#### Clinical Presentation and Evaluation

Older patients with asthma may present with wheeze, morning phlegm, chest tightness, shortness of breath at rest, chronic cough, and symptoms that are often worse at night (164–167). Older persons with asthma have a varying duration of symptoms on presentation (168). Patients with late-onset asthma have a higher forced expiratory volume in 1 second than life-long asthmatics (168,169), but patients with long-standing disease may be less sensitive to their asthma symptoms and more likely to have fixed obstruction (158,167).

Thirty percent of older patients referred for PFT evaluation have reversible airway obstruction, particularly male patients and nonsmokers (170). Patients with more severe obstruction have greater bronchodilator responses compared to patients with mild disease (170). In older patients with normal baseline spirometry in whom asthma is being considered, methacholine challenge testing can be safely used (164,171).

Asthma can be challenging to differentiate from COPD in older patients, particularly in those with physical disability (163) (Table 4). In one study of asthma in older patients, nearly 20% of patients were erroneously diagnosed with COPD (163). Older asthmatic patients have more bronchodilator response (159,172,173), are more likely to be atopic, and have more eosinophils in serum and sputum than patients with COPD (159,172,173). Heavy smoking history, hyperinflation, hypoxemia, and diffusion impairment are more commonly seen in patients with COPD (159,172,173).

#### Risk Factors

Comorbid diseases and obesity are risk factors for asthma in older patients (174–176). Gastroesophageal reflux disease can also complicate asthma symptoms in older persons (177,178). Several medications commonly used in older persons are associated with asthma and include beta-blockers, nonsteroidal anti-inflammatory medications, and postmenopausal hormone replacement therapy (179–181).

#### Treatment

Asthma in older persons should be managed according to the recommendations made by the National Asthma Education and Prevention Program. The pharmacotherapeutic options are mostly the same as those used for managing COPD with the same side effects and toxicities (see Table 2). However, ICS are first-line treatment for patients with moderate or severe persistent asthma. In addition, antileukotriene
agents may provide symptomatic improvement in older asthmatics (182).

ICS may be underutilized in older asthmatics (158,159). In nonsmoking, older asthmatics in the Cardiovascular Health Study, less than half of patients were using ICS or systemic corticosteroids and 39% of patients received no asthma medications at all (159). Combination ICS and long-acting beta-agonist inhalers in older patients with asthma may decrease hospitalization rates and mortality compared to either treatment alone (118). However, as reviewed for treatment of COPD, there are concerns over the cardiovascular safety profile of long-acting beta-agonists (97).

Treatment adherence is low in older patients with asthma (183). In addition to mechanical limitations, comorbid diseases and cognitive impairment negatively affect adherence to asthma regimens in older patients (183). Depression can also decrease adherence to asthma medications (159,184). Nonpharmacological management including asthma-focused telephone interviews, symptom and medication diaries, and assessment of drug usage may improve adherence (183,185).

Outcome

Older patients with asthma die from their disease more than younger patients and account for 50% of asthma deaths (45,186,187). As with COPD, comorbidity contributes to increased mortality in older asthmatic patients. Although more respiratory symptoms are associated with higher mortality even in the absence of lung disease, lower HRQOL has not been associated with mortality in older persons with asthma (188). Forced expiratory volume in 1 second declines more in older asthmatics compared with nonasthmatics, particularly in those with longer duration of disease (167,189). Studies have shown significant HRQOL impairment in older asthmatic patients (159) (Table 5).

LUNG CANCER

Epidemiology

Lung cancer increases with age, particularly after age 60. The median age of patients diagnosed with lung cancer is 70 years old (190). Lung cancer incidence peaks in the 75- to 79-year-old age group (IR = 9.5, age 40–44; IR = 167.8, age 60–64; IR peak = 431.8/100,000) (191) (Figure 3).

Non–small cell lung cancer (NSCLC) makes up 85% of lung cancer cases. Lung cancer can metastasize to liver, bone, brain, and adrenal glands (192,193) and more than half of patients diagnosed with NSCLC present with metastatic disease (194). Small cell lung cancer accounts for 10%–15% of lung cancer. Twenty to 40% of patients...
Comorbidities found no difference in older patients who undergo definitive staging and treatment than younger patients (224). This may be related to increased perioperative mortality in older patients (210). There are a number of clinical tools available to assess for cognitive or functional impairment in older patients (210–214). Although there is no specific recommendation for which tool to use in older patients with lung cancer, the Barthel Index, and Mini-Mental State Examination have been used in prior studies (210,211,215,216).

Despite the American College of Chest Physicians statement on age, older patients with lung cancer receive less definitive staging and treatment than younger patients (217–222). This may be related to increased perioperative mortality in older patients (211,223–227). However, the burden of comorbidity may not have been completely considered in these studies (224,225,227). Recent studies accounting for comorbidities found no difference in older patients who undergo surgical resection compared with younger patients (228–230) and disease recurrence is no different in older compared with younger patients with early-stage NSCLC (231).

### Risk Factors

Cigarette smoking is the number one risk factor for lung cancer although 10%–15% of patients with lung cancer are nonsmokers (203,204). Smoking cessation decreases risk of lung cancer, even among patients who smoke into their sixth decade (205). Female gender is a risk factor for adenocarcinoma in never smokers (206).
Patients undergoing chemotherapy or radiation therapy for lung cancer often have medical comorbidities (208). Chemotherapy and radiation therapy are associated with a number of toxicities in older patients (232) and prevalent comorbidities may contribute to treatment toxicity (233). Modification of chemotherapy dose and scheduling is possible to allow safe chemotherapy administration (234), and there is a growing body of evidence to suggest that older patients tolerate a variety of chemotherapy agents for both NSCLC and small cell lung cancer (221,235–238).

**Outcome**

Lung cancer is responsible for more cancer-related deaths than breast, prostate, and colon cancer combined (239). Lung cancer mortality increases with age. Patients aged 65 years and older account for 80% of lung cancer deaths and 20% of lung cancer deaths are in patients aged 80 years and older (240).

Older patients with early-stage NSCLC who undergo surgery have similar postoperative survival to younger patients (241). Patients with metastatic NSCLC have had modest improvements in survival over the last three decades with chemotherapy (240), and this has been observed in older patients as well (242). The effects of chemotherapy on HRQOL in older patients are complicated with some areas of symptomatic improvement but also decrements in HRQOL due to drug toxicity (243) (Table 6).

**Idiopathic Pulmonary Fibrosis**

**Epidemiology**

IPF is a relatively rare, progressive fibrotic lung disease of unclear etiology that primarily affects older patients. Prevalence and incidence increase with age, particularly after the sixth decade (Figure 4) (244,245). Overall, the prevalence of IPF in the United States is estimated around 42.7/100,000 but is likely an underestimate (246,247). Incidence is estimated at 10.7 and 7.4 per 100,000 men and women, respectively (246).

**Clinical Presentation and Evaluation**

Dyspnea and dry cough are common presenting symptoms of IPF and dry rales can be present on physical examination. Comorbidities, including diabetes, coronary artery disease, obstructive sleep apnea, steroid-related osteopenia, and sarcopenia, are common in IPF (246,248). Older patients with advanced IPF are at increased risk of pulmonary hypertension (249–251). Patients with both IPF and pulmonary hypertension have significantly higher mortality (252–255).

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<tr>
<td><strong>Epidemiology</strong></td>
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<tr>
<td>Incidence increases with age</td>
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<td>Peak incidence of 431.8/100,000 person years</td>
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<td>in 75- to 79-year-old age group</td>
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<td>Clinical presentation and evaluation</td>
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<tr>
<td>Non–small cell lung cancer most common</td>
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<tr>
<td>Frequently present with metastatic disease</td>
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<tr>
<td>Cough, shortness of breath</td>
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<td>Hemoptysis</td>
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<td>Chest pain, hoarseness</td>
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<td>Constitutional symptoms: fatigue, weight loss</td>
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<td>Paraneoplastic syndromes</td>
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<td>American College of Chest Physicians guidelines after staging</td>
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<td>Multidisciplinary approach</td>
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<td>Determinants of outcome and health-related quality of life</td>
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<td>Depends on stage, treatment, comorbidities, functional status</td>
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Note: COPD = chronic obstructive pulmonary disease.
A restrictive ventilatory defect with diffusion impairment is seen on PFTs. Interstitial pulmonary infiltrates are seen on chest x-ray and CT scan with honeycombing and traction bronchiectasis in more advanced IPF. Lung biopsy may not be necessary if an experienced pulmonologist or radiologist in interstitial lung disease and IPF can make a confident diagnosis based on clinical and radiographic information (1,256).

Risk Factors

Smoking is the main identifiable risk factor for IPF although the pathophysiology of IPF is still uncertain (244,245). Familial variants have been identified (257). Chronic aspiration may be a risk factor (1,258). Gastroesophageal reflux disease is common in patients with IPF and may also be a risk factor for both disease development and progression (259–262). Acute and chronic viral infections might contribute to development and progression of IPF. There is some data implicating Ebstein–Barr virus in IPF, but the specific role of viruses has not been fully elucidated (263–266).

Treatment

According to the most recent American Thoracic Society/European Respiratory Society consensus statement, there is no proven treatment that is effective for IPF (258). Combination therapy with prednisone, azathioprine, and N-acetylcysteine may slow decline in forced vital capacity compared with prednisone and azathioprine alone, but the clinical significance of these findings is not clear (267,268). In multinational, double-blind, placebo-controlled trials, pirfenidone has shown promising results in reducing rate of decline in lung function and may even improve vital capacity in patients with mild–moderate disease (269–275). Early studies have also suggested pirfenidone may decrease acute IPF exacerbations (269). Optimizing comorbid diseases, supplemental oxygen therapy, and pulmonary rehabilitation may help preserve and perhaps improve functional status (246,276).

Outcome

Outcomes for older patients with IPF are quite poor. Only 20%–30% of patients survive 5 years after diagnosis (280,281). Older age at presentation is associated with shorter survival times. In addition, heavy tobacco use, lower body mass index, greater gas exchange impairment, more radiographic abnormalities, and other pulmonary diseases associated with worse survival (282). Furthermore, given the high mortality, functional status may serve as a valuable measure of response to therapy and prognosis (283,284) (Table 7).

Conclusions

Pulmonary diseases are common in older patients. Presenting symptoms are nonspecific and overlap with each
other as well as with nonpulmonary diseases. Although some decline in pulmonary function is associated with aging, clinically significant pulmonary diseases need to be considered in symptomatic patients. Cigarette smoking is the strongest risk factor for nearly all pulmonary diseases in older patients. Age and comorbidity often affect patients’ abilities to respond to, adhere to, and tolerate treatment of lung diseases. Older persons with lung diseases should receive routine vaccinations. Easy-to-administer, effective treatments for lung diseases should undergo rigorous evaluation in randomized, controlled trials with aging patients.

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PULMONARY DISEASES IN OLDER PERSONS


