CPG SERIES

CLINICAL PRACTICE GUIDELINE

PALTmed
POST-ACUTE AND LONG-TERM CARE MEDICAL ASSOCIATION

COPD MANAGEMENT

in the Post-Acute and Long-Term Care Setting

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Preface

This clinical practice guideline (CPG) has been developed as a component of a project conducted by Post-Acute and Long-Term Care Medical Association (PALTmed), the national professional association of medical directors, attending physicians, and other interprofessionals practicing in the post-acute and long-term care (PA/LTC) continuum. This is one of a series of guidelines undertaken as part of PALTmed's mission to improve the quality of care delivered to patients in these settings.

Original guidelines are developed by interprofessional workgroups that consist of practitioners and others involved in patient care in PA/LTC facilities. These workgroups utilize systematic reviews, journal articles, and other information obtained through a thorough literature search to develop a concise, usable guideline tailored to the PA/LTC setting.

The guideline development and revision process is directed by PALTmed's Clinical Practice Guideline Steering Committee. Each year the Steering Committee reviews all PALTmed's CPGs that are 3 years old and commissions a thorough literature review to determine whether the content of each guideline remains current. The PALTmed Clinical Practice Committee selects the existing guidelines to be revised, and new guidelines to be created, based on (1) the Steering Committee's recommendations, (2) data collected, (3) an assessment of the difficulty of development and relevance to the PALTmed membership, and (4) congruence with the PALTmed Strategic Plan. PALTmed's Board of Directors has final approval over this process.

Purpose

PALTmed seeks to develop and revise guidelines that focus on specific concerns and common issues in the PA/LTC setting. Although other agencies, organizations, and associations have developed guidelines for conditions that occur in elderly and chronically ill individuals, many of these guidelines limit or omit considerations unique to the PA/LTC population, such as team-based care.

PALTmed guidelines emphasize key care processes and are created to be used in conjunction with facility-specific policies and procedures that guide staff and practitioner practices and performance. They are meant to be used in a manner appropriate to the population and practice of a particular facility. Guideline implementation may be affected by resources available in the facility, including staffing, and will require the involvement of all those in the facility who have a role in patient care.

PALTmed considers that PA/LTC facilities play a significant role in the lives of older adults and their families and considers optimal medical care and health promotion to be priorities in this setting.

PALTmed guidelines are not intended to offer an exhaustive review of the condition of interest. They focus instead on the practical management of the condition in the PA/LTC setting, stressing aspects of care that may differ significantly from or merit special emphasis when compared with community- based care for younger adults with the same condition.

Audience

This guideline is intended for members of the interprofessional team in PA/LTC settings. Team members may include the medical director, attending physicians, director of nursing, advanced practice clinicians, nursing staff, consultant pharmacist, and other professionals such as therapists, social workers, dietitians, and nursing assistants who care for patients residing in PA/LTC facilities.

PALTmed CPGs address many functions, interventions, and tasks related to the recognition, assessment, treatment, and monitoring of various medical conditions and situations. The CPGs focus on process (what should be done) rather than on personnel (who should perform specific tasks). For example, a variety of health care professionals working in the PA/LTC setting, including nursing assistants, licensed nurses, dietitians, and social workers, may make and document observations (e.g., that a patient does not sleep at night, has become more withdrawn, or has a change in usual eating patterns). Only some of these professionals, however, may be qualified to determine the significance of those observations (e.g., the cause of sleeplessness or of a change in eating patterns). In contrast, practitioners may not be present to make observations but are trained to analyze the significance and causes of symptoms.

Thus, each facility should ensure that tasks are done correctly and by the appropriate interprofessional team members. It is important for observers to make and effectively document their observations; when interpretation of those observations is not within the scope of their training or practice, they should receive appropriate support from practitioners.

Assumptions

Practice guidelines for the PA/LTC setting should be consistent with the fundamental goals of desirable practice in this setting. Operationally, this requirement means that the care team should systematically address (1) each patient's risk factors for multiple diseases and conditions; (2) the adverse consequences of these diseases and conditions on the patient's functioning and quality of life; and (3) the benefits and burdens of prescribed interventions.

When patients in the PA/LTC setting are at or near the end of life, care goals will shift from curative care, functional improvement, or physical stability to end-of-life/comfort care. PALTmed guidelines address this transition and provide suggestions for appropriate modification of the patient's care plan.

PA/LTC facilities care for a variety of individuals, including younger adults with chronic diseases and disabilities, short-stay patients needing post-acute care, and very old and frail individuals with multimorbidity. Patient-centered care means establishing individualized goals of care for each patient.

Thus, when a workup or treatment is suggested, it is crucial to consider whether such a step is appropriate for that individual. A workup may not be indicated if the patient has a terminal or end-stage condition (i.e., with a life expectancy of less than 6 months), if it would not change the management course, if the burden of the workup is greater than the potential benefit, or if the patient or his or her legally authorized representative would refuse treatment. It is important to carefully document in the patient's medical record the reasons for decisions not to treat or perform a workup or for choosing one treatment approach over another.

How to Use These Guidelines

Each guideline includes a narrative portion that covers definition, recognition, assessment, treatment, and monitoring of the condition being addressed. Recognition identifies the presence of a risk or condition. Assessment clarifies the nature and causes of a condition or situation and identifying its impact on the individual. Treatment is the selection and provision of appropriate interventions for that individual. Monitoring is the review of the course of a condition or situation as a basis for deciding to continue, change, or discontinue interventions. Each guideline also includes an algorithm that summarizes the steps involved in addressing the condition or situation that is the focus of the guideline.

Each guideline now also includes recommendations. The system PALTmed has adopted for grading the recommendations in its CPGs is modified from the GRADE Working Group system, a framework for grading the quality of evidence and the strength of recommendations that can be applied across a wide range of interventions and contexts. (See Grading System for Recommendations in PALTmed Clinical Practice Guidelines.)

Terminology

We recognize that people who reside in PA/LTC facilities are residents. Throughout these guidelines, however, we use the term patient(s) because we are addressing individuals within the context of treating a medical condition. When referring to pharmaceutical products, we avoid the use of brand names and refer to classes of drugs whenever possible.

A nursing home/skilled nursing facility (NF/SNF) is a place of care for people who require 24-hour nursing and rehabilitation for chronic medical conditions or impaired mental capacity and who have significant deficiencies in activities of daily living. The goal of care is to assist the individual in achieving his or her highest level of function and well-being. Both SNFs and NFs care for frail elderly patients and younger adults with physical disabilities (although pediatric and other specialized SNFs also exist). Many SNFs and NFs offer special care units (e.g., dialysis, ventilator units).

A subacute/post-acute care unit (sometimes called a "step-down" unit) is a facility in which care can be the bridge between an acute hospital stay and a return to a community home. It combines aspects of both the hospital and the SNF to reduce the cost of services while maintaining quality of care. This type of care requires frequent patient reassessment and review of the clinical course and treatment plan for a limited time period, until the patient's condition has stabilized or a predetermined treatment course is completed.

To be consistent with the terminology now used by the Institutes of Medicine (IOM), Centers for Medicare and Medicaid Services, Health Resources and Services Administration, and other agencies, we have adopted the term interprofessional in place of interdisciplinary. As defined by Hall and Weaver,[1] interprofessional means "a group of individuals from different disciplines working and communicating with each other [as] individuals." According to the IOM,[2] "members of an interprofessional team communicate and work together, as colleagues, to provide quality, individualized care for patients." We have also adopted the term multimorbidity to refer to the co-occurrence of two or more chronic medical conditions in one person.

References

1. Hall P, Weaver L. Interdisciplinary education and teamwork: A long and winding road. Med Educ 2001; 35: 867–875.
2. Greiner AC, Knebel E, eds. Health Professions Education: A Bridge to Quality. 2003. Institute of Medicine, Committee on the Health Professions Education Summit. Washington, DC: The National Academies Press. Available at http://www.iom.edu/Reports/2003/health-professions-education-a-bridge-to-quality.aspx. Accessed 8/19/2014.

GRADING SYSTEM FOR RECOMMENDATIONS IN AMDA CLINICAL PRACTICE GUIDELINES

The system PALTmed has adopted for grading the recommendations in its clinical practice guidelines is modified from the GRADE Working Group system.*

Judgments about the quality of evidence require assessing the validity of results for important outcomes in individual studies. Explicit criteria were used in making these judgments. In the GRADE Working Group, a systematic review of available evidence guides these judgments. Sequential judgments are made concerning the following factors:

- The quality of evidence across studies for each important outcome
- Which outcomes are critical to a decision
- The overall quality of evidence across these critical outcomes
- The balance between benefit and harm
- The strength of recommendations

Reviewers consider four key elements: study design, study quality, consistency, and directness.

Definitions

The **quality of evidence** indicates the extent to which one can be confident that an estimate of effect is correct.

The **strength of a recommendation** indicates the extent to which one can be confident that adherence to the recommendation will do more good than harm.

Study design refers to the basic study design (broadly, observational studies and randomized trials).

Study quality refers to the detailed study methods and execution. Appropriate criteria are used to assess study quality for each important outcome. For randomized trials, for example, these criteria might include the adequacy of allocation concealment, blinding, and follow up. Reasons for downgrading a quality rating must be explicit (e.g., failure to blind patients and physicians reduced the quality of evidence for an intervention's impact on pain severity, a serious limitation).

Consistency refers to the similarity of effect estimates across studies. If there is important unexplained inconsistency in study results, confidence in the effect estimate for that outcome is reduced.

Directness refers to the extent to which the people, interventions, and outcome measures in the studies are similar to those of interest. For example, the directness of the evidence may be uncertain if the people of interest are older, sicker, or have more comorbidity than those in the studies. To determine whether important uncertainty exists, one can ask whether there is a compelling reason to expect important differences in the effect size. Because many interventions have more or less the same relative effects across most patient groups, reviewers should not use overly stringent criteria in deciding whether evidence is direct.

Criteria

AMDA's Clinical Practice Committee has chosen to use the following criteria for assigning grade of evidence due to the lack of high quality randomized controlled trials in post-acute and/or long-term care:

* Atkins D, Best D, Briss PA, et al; GRADE Working Group. Grading quality of evidence and strength of recommendations. BMJ 2004;328:1490

Quality of Evidence

High: At least 1 randomized controlled trial (RCT) ***OR*** 3 pre / post interventions or other prospective interventions or 3 well-structured, relevant observational studies.

Moderate: Studies that use well-tested methods to make comparisons in a fair way, but where the results leave room for uncertainty (e.g., because of the size of the study, losses to follow-up, or the method used for selecting groups for comparison).

Low: Studies in which the results are doubtful because the study design does not guarantee that fair comparisons can be made.

Strength of Recommendation

Strong: Benefits clearly outweigh risks.

Weak: Benefits are balanced with risks.

Insufficient: Evidence is inadequate to make a recommendation.

Criteria for *decreasing* the grade of a recommendation:

- Serious (- 1) or very serious (- 2) limitation to study quality
- Important inconsistency (- 1)
- Some (- 1) or major (- 2) uncertainty about directness
- Imprecise or sparse data (- 1)
- High probability of reporting bias (- 1)

Criteria for *increasing* the grade of a recommendation:

- Strong evidence of association: Significant relative risk greater than 2 (less than 0.5), based on consistent evidence from two or more observational studies, with no plausible confounders (+1)
- Very strong evidence of association: Significant relative risk greater than 5 (less than 0.2), based on direct evidence with no major threats to validity (+2)
- Evidence of a dose-response gradient (+1)
- All plausible confounders would have reduced the effect (+1)

These criteria are cumulative – e.g., if RCTs have serious limitations ***and*** there is uncertainty about the directness of the evidence, the grade of evidence would drop from high to low.

RECOMMENDATIONS

COPD Management in the Post-Acute and Long-Term Care Setting

See Grading System for Recommendations in PALTmed Clinical Practice Guidelines immediately before this table (pp vii-viii).

Recommendation	Quality of Evidence	Strength of Recommendation
General		
1. Cognitively able patients and family members should be provided with appropriate education regarding COPD and its management.	High	Strong
2. All PA/LTC facilities should be smoke-free and should provide ongoing education to both patients and staff about the adverse health effects of smoking.	High	Strong
3. Facilities should implement programs and policies to encourage smoking cessation	Low	Strong
4. Facilities should implement policies that require all staff to obtain annual influenza vaccination.	High	Strong
5. Facilities should implement policies and procedures that facilitate the recognition and appropriate management of COPD.	Low	Strong
Recognition		
6. Anxiety and depression often occur in patients with COPD. When present, these coexisting conditions should be recognized and treated.	High	Strong
Assessment		
7. Facilities may wish to consider performing pulse oximetry (at rest and with activity) routinely in all new patients as part of the admission assessment.	Low	Strong
8. If feasible, spirometry should be performed, as needed, if a diagnosis of COPD has not already been established.	High	Strong
9. The patient's functional status should be assessed at baseline, quarterly, and following an acute exacerbation, or when comorbid disease is present.	Moderate	Strong
Treatment/Intervention		
10. Pulmonary rehabilitation is considered the standard of care for the treatment of COPD.	High	Strong
11. Oxygen therapy is a principal treatment for patients with severe COPD, based on measured pO2 or oxygen saturation.	High	Strong
12. Influenza vaccine is advised yearly for all individuals with COPD. Pneumococcal vaccine is also advised for all COPD patients, regardless of age.	High	Strong

Recommendation	Quality of Evidence	Strength of Recommendation
13. Most patients with COPD in PA/LTC should be treated with a long-acting inhaled anticholinergic medication and/or a long-acting inhaled beta-2 agonist, supplemented by other medications as needed for maintenance treatment.	Moderate	Strong
Monitoring		
14. Caregivers should closely observe patients with COPD for possible signs of nutritional deficiency.	High	Strong

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COPD MANAGEMENT

in the Post-Acute and Long-Term Care Setting

DEFINITION

Chronic obstructive pulmonary disease (COPD) is a preventable, treatable disease characterized by persistent airflow limitation.[1,2] COPD is not fully reversible. The airflow limitation is usually progressive and associated with an abnormal inflammatory response of the lungs to noxious particles or gases, primarily from cigarette smoking. COPD has significant systemic consequences.[1]

Emphysema, or destruction of the gas-exchanging surfaces of the lung (alveoli), is a term that describes specific pathological structural changes in patients with COPD. The term *emphysema* is often used incorrectly.[2]

Chronic bronchitis, is the presence of cough and sputum production for at least 3 months in each of 2 consecutive years,[2] and remains a clinically and epidemiologically useful term. The term does not, however, reflect the major impact of airflow limitation on morbidity and mortality in COPD patients. In some patients, cough and sputum production may precede the development of airflow limitation, whereas other patients develop significant airflow limitation without chronic cough and sputum production.[2]

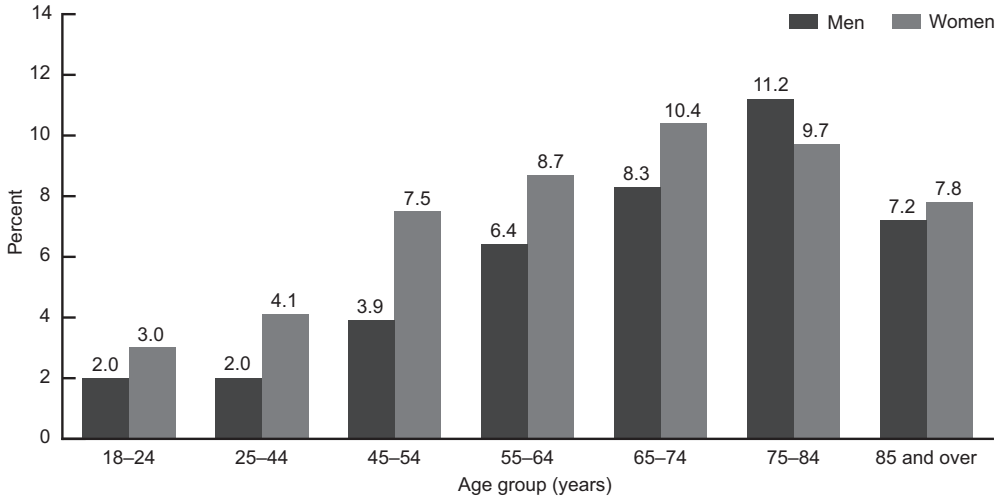
INTRODUCTION

Chronic obstructive pulmonary disease (COPD) is currently the third leading cause of death in the United States. COPD caused an estimated 134,676 deaths in the United States in 2010.[3] The disease reduces life expectancy and is one of the more significant conditions that impacts comorbidity-adjusted life expectancy.[4]

According to 2013 data from the Behavioral Risk Factor Surveillance System, 12.3% of US adults aged 75 years or older have been told by a physician that they have COPD.[5] Unrecognized early disease is common because COPD is usually not diagnosed until it is clinically apparent and moderately advanced; prevalence and morbidity data tend to underestimate the total burden of the disease. For example, 12.7 million US adults (aged 18 and over) were estimated to have COPD in 2011,[3] whereas close to 24 million US adults have evidence of impaired lung function, indicating an under-diagnosis of COPD.[6] Since 1987, the prevalence of COPD has been significantly higher among women than among men.[3,6] In 2010, more than 70,000 women died from COPD compared with 64,000 men.[3]

Specific data on the burden of COPD in the post-acute and long-term care (PA/LTC) population is sparse. COPD is estimated to affect 14.2% of adults aged 65 and older,[7] and studies suggest that one of every six patients admitted to PA/LTC facilities may have a history of emphysema or COPD.[8] In 2004, 10% of Medicare recipients in California who had COPD were admitted to a skilled nursing facility.[9] In a Medicaid COPD population, approximately 22% of respiratory-related health care costs were nursing home costs.[9]

Figure 1 Prevalence of COPD among adults aged 18 and over, by age group and sex: United States, annual average 2007-2009



Source: CDC,[10] Akinbami and Liu, 2011[11]

As shown in Figure 1, the prevalence of COPD increases with age.[11] Lung function declines with aging.[12] As a result of changes in connective tissue with aging, the size of the airways reduce and the alveolar sacs become narrow. Chest wall compliance is reduced, and sarcopenia results in intercostal muscle atrophy.[13] Forced expiratory volume in 1 second (FEV1) normally declines by 30 mL per year from its peak at age 20 to 25.[14] This decline is approximately double that (60 to 70 mL per year) in smokers older than 65.[13] These underlying changes in lung function and poor sensitivity to bronchoconstriction and hypoxia can place older adults at greater risk of mortality or other complications from COPD.[12] The estimated annual rate of hospitalization for COPD is higher for people aged 65 and older than for younger patients.[15] In addition, a typical COPD patient is likely to have multiple chronic conditions (multimorbidity) owing to advanced age and smoking history.[9]

By far the most important, and preventable, risk factor for COPD is tobacco smoking.[3,14] FEV1 declines by about 60 mL annually in smokers[14]; the more cigarettes smoked, the steeper the rate of decline. Reduced FEV1 is a predictor of increased mortality from COPD, heart disease, lung cancer, stroke, and all causes.[14] More rapid FEV1 decline is also predictive of morbidity and hospitalization rates. Additional risk factors for accelerated decline in FEV1 include airway reactivity, frequent exacerbations, and possibly chronic systemic inflammation.[14]

In a prospective survey of community-dwelling patients with severe airflow limitation (see Step 3), the most prevalent patient-reported symptoms were dyspnea (94%), fatigue (71%), dry mouth (60%), coughing (56%), and anxiety (51%). Other highly prevalent symptoms were drowsiness (47%), irritability (42%), feeling nervous (40%), and wheezing (40%). One third of patients reported significant pain.[16] Impaired cognitive function is also a feature of COPD as the risk of developing mild cognitive impairment is significantly increased in COPD patients.[2]

The cost of COPD in the United States was estimated to be $49.9 billion in 2010, which includes approximately $20 billion in indirect costs and approximately $30 billion in direct health care costs.[17] Direct health care costs include physician office visits, hospitalizations, home care, and medications. In the United States, about 75% of COPD costs are for services associated with exacerbations,

such as hospitalization cost.[1] The cost of care per patient increases with each stage of disease, and hospitalization is the most important cost variable. COPD is associated with high rates of hospital admission and readmission, and costs have been reported to increase with each readmission.[17] No specific data on the cost of care for those with COPD living in PA/LTC facilities are available.

Barriers to the Recognition, Assessment, and Optimal Management of COPD in the Post-Acute and Long-Term Care Setting

By virtue of advanced age alone, a degree of respiratory compromise can be expected to exist in most patients admitted to PA/LTC facilities. Recognition, assessment, treatment, and monitoring of COPD in the PA/LTC setting is challenging, however, for several reasons:

- Although shortness of breath is not uncommon among newly admitted patients, the reasons for, or the severity of, this symptom may not be identified, or the underlying cause may be misdiagnosed.
- Because COPD may present atypically in frail elderly people, the staff of PA/LTC facilities may be unaware of the prevalence of respiratory compromise in this population and may have limited knowledge of COPD signs and symptoms.
- Caregivers may erroneously believe no effective therapy exists for COPD and a decline in the patient's condition is inevitable.
- COPD is often a comorbidity rather than the primary reason for a patient's admission to a PA/LTC facility.
- Few physical symptoms clearly differentiate COPD from other respiratory conditions, such as asthma, and from other chronic diseases common in frail elderly people, such as congestive heart failure (CHF).
- Information about a patient's diagnosis of COPD, or of symptoms suggesting the presence of COPD, may not be communicated from the hospital to the PA/LTC facility or between staff at the PA/LTC facility.
- It may be difficult to obtain a detailed smoking history from a newly admitted patient.
- Most PA/LTC facilities lack access to on-site diagnostic testing that would confirm a diagnosis of COPD.
- No standardized screening tool exists to assess patients for COPD on admission to a PA/LTC facility.
- Practitioners may be unaware of current bedside pulmonary function testing devices and/or reimbursement for their use.

Facility Preparedness. Medical directors and directors of nursing in PA/LTC facilities should implement policies and procedures that facilitate the recognition and appropriate management of COPD.

Staff education. Adequate, up-to-date education and training about COPD are essential to enable staff of PA/LTC facilities to identify patients who have COPD signs or symptoms. Training of nursing assistants is vital because, in most cases, they have the highest level of patient contact. Because of staff turnover, training must be repeated routinely to maintain a satisfactory skill level among all nursing assistants. Clinicians and caregivers also need education and training to understand what treatment of COPD can achieve and to have realistic expectations of the disease progression, process, and trajectory.

Staff whose responsibilities include administering inhaled medications or the use of specialized devices or equipment to improve airway and respiratory management should be trained and their competency should be assessed regularly. Because different types of inhalers and nebulizers, as well as respiratory monitoring and treatment equipment, require different administration

techniques, training should cover the administration of all types of inhaled medications and all respiratory equipment used by patients in the facility.

Interprofessional care management. The interprofessional team managing the care of the patient with COPD may include the patient, family caregivers, practitioner, nurse, nursing assistant, consultant pharmacist, dietitian, social worker, speech-language pathologist, and physical or occupational therapists. Respiratory therapists may also be part of the interprofessional treatment team, especially in facilities with ventilator units. All team members may participate in the evaluation and management of the patient with COPD at different stages, depending on the patient's needs. Consultative support from a pulmonologist may also be useful.

Infection control. An estimated 70% to 80% of acute exacerbations of COPD are caused by respiratory infections.[18] Facility staff and caregivers who are sneezing or coughing, or who have signs of a respiratory infection, can transmit those infections to patients, potentially leading to acute exacerbations of COPD. Staff members who are suffering from a respiratory infection should be asked to remain at home. Facilities should implement policies that strongly encourage all staff to obtain annual influenza vaccination. (See PALTmed's *Immunization in the Long-Term Care Setting* tool kit.[a])

Air quality. Facility-wide smoke-free policies promote the health of both patients and staff and may reduce acute exacerbations of COPD. Smoke-free policies should be augmented by programs to help staff quit smoking. (See Step 9.) Adequate ventilation, vigilant housekeeping to control dust and clutter, and elimination (to the extent possible) of the use of scented products within the facility (e.g., cleaning products, disinfectants, perfumes) can also improve air quality and may increase the comfort of patients with airflow limitation.

Outcomes That May Be Expected from Implementation of this Clinical Practice Guideline

Although COPD is by definition not fully reversible, effective interventions exist that can ameliorate symptoms and significantly improve patients' quality of life. For example, smoking cessation usually reduces the rate of FEV1 decline to normal or near normal.[14]

Outcomes that may be expected from the implementation of this clinical practice guideline include the following:

- Earlier identification and better differential diagnosis of COPD
- Higher value care for COPD
- Improvements in:
  - Appropriate use of oxygen therapy, respiratory devices, and medication management of COPD, resulting in improved resource utilization and decreased patient-care costs
  - Comfort care for patients with end-stage COPD
  - Awareness and understanding of the disease among both affected patients and their caregivers
  - Patient function in activities of daily living (ADLs) and participation in social activities
  - Patient quality of life
  - Staff satisfaction and confidence in their ability to manage COPD
  - Symptom control and patient perception of symptom control

[a] PALTmed. Immunization in the Long-Term Care Setting. LTC Information Series. Columbia, MD.

- Understanding of when and how to initiate palliative care
- Nutritional status and management of multimorbidity

- Reductions in:
  - Anxiety and depression caused by shortness of breath and other COPD symptoms
  - Frequency of acute exacerbations of COPD
  - Frequency of hospital transfers and readmissions for acute exacerbations of COPD
  - Incidence of sleep disturbance
  - Prevalence of smoking in the facility
  - Rates of viral and bacterial infections in COPD patients

RECOGNITION

In the PA/LTC facility, patients with COPD likely fall into one of the following four categories:

- Those with a primary diagnosis of COPD
- Those with a secondary diagnosis of COPD
- Those who have unrecognized COPD or who develop symptoms while residing in the facility

Those with end-stage or advanced COPD (e.g., patients with chronic hypoxia, pulmonary hypertension, skeletal muscle wasting)

STEP 1

Screen the newly admitted patient for an established diagnosis of COPD and for risk factors for COPD. Examine the patient's records for a diagnosis of COPD or for COPD risk factors. In particular, review the patient's records for

- Abnormal results for pulse oximetry and vital signs, with an emphasis on heart and respiratory rates at rest and with activity
- Results of tests of arterial blood gases
- Results of pulmonary function tests
- Use of bronchodilators, systemic or inhaled corticosteroids, anticholinergic agents, or other medications that may indicate the presence of pulmonary problems
- Chest X-ray or other imaging data consistent with a diagnosis of COPD

On admission or during the pre-admission evaluation, assess the patient's respiratory status. Consider evaluating the patient for COPD if any of the following signs or symptoms are noted:

- Abnormal breath sounds (e.g., crackles, prolonged expiratory phase, rales, reduced air movement, rhonchi, wheezing)
- Chronic cough or dyspnea at rest or with activity
- Chest congestion
- Increased anterior-posterior (A-P) diameter (i.e., barrel chest)
- Use of accessory muscles during respiration (normal breathing)

Ask the patient and family members if the patient has a history of smoking, a history of lung disease, or a history of other signs and symptoms that may indicate risk for COPD (Table 1).

TABLE 1
Signs and Symptoms That May Indicate Risk for COPD

- History of smoking (including year started, year quit if not a current smoker, and average number of packs smoked daily, pack-years)
- History of passive exposure to smoke
- Activity intolerance or slowness in performance of ADLs because of dyspnea
- Anxiety or depression
- Cognitive problems, which may reflect poor oxygenation or hypercapnia
- History of recurrent pneumonia or chronic bronchitis
- Hospitalization for breathing difficulty, respiratory insufficiency, respiratory failure, shortness of breath
- History of sleep-disordered breathing
- History of use of CPAP, BiPAP, or other supportive ventilation devices
- History of use of respiratory equipment such as oxygen therapy, aerosolized medication, and secretion clearance devices
- History or observation of sputum production
- History of exposure to organic and inorganic dusts, chemical agents, and fumes
- Weight loss or gain, which may reflect nutritional problems or heart failure associated with COPD

ADL: activities of daily living; BiPAP: bilevel positive airway pressure (Respironics Inc); COPD: chronic obstructive pulmonary disease; CPAP: continuous positive airway pressure.

Smoking is the dominant risk factor for COPD. More than 90% of patients with COPD are current or former cigarette smokers; cigar and pipe smokers and inhalers of second-hand smoke are also at risk for COPD. Consider the possible presence of COPD in any patient with a history of smoking. One systematic review showed that a history of ever having smoked (vs. never having smoked) had a sensitivity of 92% and a specificity of 49% for diagnosing airflow obstruction.[19] Heavy smoking in particular is highly predictive of COPD. In the 2011 guideline from the American College of Physicians, American College of Chest Physicians, American Thoracic Society, and European Respiratory Society, *heavy smoking* is defined as more than 40 pack-years (number of packs smoked per day multiplied by number of years smoked).[20]

Facilities may wish to consider performing pulse oximetry (at rest and with activity) routinely in all new patients as part of the admission assessment. Pulse oximeters are relatively inexpensive to purchase and the test is noninvasive and simple to perform. Pulse oximetry should be performed only if staff are trained and skilled in the use of the instrument and in the correct interpretation of results. Note that an agreed upon "activity" standard relevant for pulse oximetry within the PA/LTC setting is currently lacking.

The results of pulse oximetry must be considered in light of the patient's overall status, including disease severity, expressed preferences, and life expectancy. A normal pulse oximetry result does not rule out a diagnosis of COPD. A low pulse oximetry result is also not diagnostic of COPD, but rather reflects an air-exchange problem with many possible causes. Pulse oximetry results alone should not be used to judge the severity of a COPD exacerbation or to decide on the need for hospitalization.

A new generation of bedside devices is increasing the availability of spirometry, although no data is available on the use of spirometry in PA/LTC and spirometry may be difficult to perform in many

patients in the PA/LTC setting. If feasible, spirometry should be performed to establish the diagnosis of COPD.[2] Other pulmonary diseases, such as pulmonary fibrosis, can cause symptoms similar to those of COPD, but will show a restrictive pattern on spirometry. In one study of veterans (average age, 65 years), only three of five patients who had been treated empirically for COPD actually had confirmed airflow obstruction by spirometry.[21] In that study, older age, history of smoking, and low body mass index (BMI) were associated with a confirmed diagnosis of COPD. In the absence of spirometry, peak flow measurement has been suggested but does not establish a diagnosis.[22]

The severity of obstruction as measured by FEV1 (Forced Expiratory Volume in 1 second) (see Table 4 in Step 3) can also provide prognostic information when taken in context of symptoms of dyspnea, walk distance, and BMI.[2] Most patients with COPD do not experience dyspnea until the FEV1 is about 50% of normal; this generally occurs only after decades of smoking. Moreover, a patient may have mild to moderate shortness of breath without realizing it. Individuals may be unaware that they slow down in their performance of activities such as dressing and eating to compensate for shortness of breath. Thus, slowness in the performance of Activities of Daily Living (ADL) may indicate a possible pulmonary function problem and may require additional nursing and practitioner evaluation. In the absence of spirometry, bedside clinical evaluation must sometimes be relied upon to evaluate airflow limitation. In this setting, the patient's heart and respiratory rates with activity and at rest and decreased intensity of breath sounds may indicate impaired pulmonary function.

ASSESSMENT

Although the diagnostic process has been broken down into steps, in practice, several steps may be performed simultaneously and it may be unnecessary to complete all steps for every patient. The step-by-step breakdown of the process is intended to ensure that a systematic and thorough assessment is undertaken in any patient in whom COPD is suspected.

STEP 2

Develop a differential diagnosis. Few symptoms and physical signs clearly differentiate COPD from other respiratory conditions such as asthma.[1,2] Dyspnea and other respiratory symptoms may also be associated with diseases such as CHF, lung cancer, pulmonary fibrosis, and pulmonary tuberculosis.[2] Both asthma and CHF may produce symptoms of cough with sputum production, dyspnea on exertion, and wheezing, all of which are also symptoms of COPD.

It is suggested that the following information, if available, be documented in the medical history of a new patient with known or suspected COPD:[2]

- Appropriateness of current medical treatments for pulmonary conditions
- Exposure to risk factors for COPD such as smoking and occupational or environmental exposures
- Family history of COPD or other chronic respiratory disease
- History of allergy, asthma, nasal polyps, respiratory infections in childhood, sinusitis, and other respiratory diseases
- History of exacerbations or hospitalizations for a respiratory disorder
- Impact of COPD on the patient's life, including activity limitations and effects on family and on psychosocial functioning (i.e., feelings of anxiety or depression)
- Pattern of symptom development
- Possibilities for reducing risk factors, especially smoking cessation
- Presence of comorbidities that may contribute to activity restriction (e.g., heart disease, malignancies, musculoskeletal disorders, mood disorders, obesity)

- Presence of typical deforming enlargement of the fingertips ("clubbing")
- Social and family support (caregiving resources) available to the patient
- Stage of COPD, if known

Certain physiologic changes that occur with the progression of COPD may be noted during the workup. These include gas exchange abnormalities, hypersecretion of mucus and mucociliary dysfunction, unplanned weight loss, low BMI, pulmonary hypertension, structural lung changes, and systemic effects such as inflammation and skeletal-muscle wasting.[1]

Although spirometry alone is required for the diagnosis of COPD, the following additional investigations (if not previously done) have been recommended by GOLD as part of the diagnosis and assessment of COPD:[2]

- Chest x-ray
- Pulse oximetry at rest and with activity
- Alpha-1 antitrypsin deficiency screening
- Exercise testing
- Diffusing capacity, lung volumes, and arterial blood gas measurement

Exercise testing and alpha-1 antitrypsin deficiency screening may not be appropriate within the PA/LTC setting. In addition, complete blood count and EKG have been recommended in patients with suspected respiratory exacerbations.[1] Some clinicians have recommended that Brain Natriuretic Peptide(BNP) be obtained to differentiate COPD from CHF, but there is no high-quality evidence supporting this practice.

X-ray. Patients with mild to moderate COPD may have misleadingly normal or near normal chest X-rays. The chest X-ray should nevertheless be considered an important part of the workup, both to provide baseline information and to exclude other diagnoses (e.g., atelectasis, CHF, interstitial lung disease, lung cancer, pleural effusion, pneumonia, pneumothorax, pulmonary scarring). Two-view dedicated chest X-rays provide better image quality for diagnostic purposes than do single-view anteroposterior portable chest X-rays.

Hemoglobin. In a patient who presents with cough, shortness of breath, and wheezing, obtain a hemoglobin level as part of a complete blood count if a recent one is not available. Evaluate the patient for anemia and related cardiac ischemia, which will exacerbate the symptoms of COPD, and polycythemia, which is caused by chronic hypoxia.

If the patient's only symptom is a chronic cough, consider other diagnoses such as sinusitis, gastroesophageal reflux disease(GERD), or a reaction to medication (notably angiotensin-converting enzyme [ACE] inhibitors). Also consider other possible causes of breathlessness, including acidosis, cardiac disease (e.g., rhythm disturbance, ischemia, or heart failure), deconditioning, excess weight, hyperthyroidism, and pulmonary emboli.

Spirometry. Spirometry is required for a definitive diagnosis of COPD, which is formally defined as a ratio of FEV1 to forced vital capacity (FVC) [FEV1/FVC ratio] of less than 70% after bronchodilator treatment.[2] The possible harms associated with empiric treatment of undiagnosed respiratory difficulty include adverse effects from medications, cost, and missing an alternative diagnosis. The patient with symptoms of COPD could have an alternative respiratory diagnosis that would benefit from a different treatment, for example, hypersensitivity pneumonitis from an environmental exposure or pulmonary fibrosis from connective tissue disease. Objective measurement of airflow

limitation, however, requires effort and cooperation and can be physically difficult for LTC patients. Cognitive impairment, hearing loss, and physical weakness may add to the difficulty of performing objective tests.[12] For these reasons, the decision to perform spirometry must be individualized on the basis of the patient's ability to participate in a way that will provide a meaningful test result that will potentially alter treatment or otherwise impact the plan of care.

Because spirometry is not widely available at LTC facilities, it is not uncommon for the diagnosis of COPD to be made clinically at the bedside. Consultation with a pulmonologist may be considered if the differential diagnosis is not clear or if the patient does not respond to therapy. The use of a screening questionnaire for COPD may be appropriate. In one study in a primary care setting that included older noninstitutionalized adults, the use of a simple COPD questionnaire alone significantly increased the yield of new COPD diagnoses compared with usual care (no interventions). The increase was similar to that in the group of patients screened with both the questionnaire and a handheld spirometric device.[23] For patients who cannot participate in spirometry and have a clinical history consistent with COPD, an empiric trial of therapy with an inhaled bronchodilator (beta-2 agonist or anticholinergic agent) may be warranted.

Table 2 presents key indicators for considering a diagnosis of COPD. The more indicators present, the greater the likelihood that the patient has COPD. Table 3 compares the presentation of asthma with that of COPD. In some patients with chronic respiratory symptoms and fixed airflow limitation, the two diseases may be difficult to distinguish and may coexist.[2]

TABLE 2
Key Indicators for Considering a Diagnosis of COPD

Consider COPD if any of these indicators are present in a patient aged over 40. Although these indicators are not in themselves diagnostic, the presence of multiple indicators increases the probability of a diagnosis of COPD.

- Dyspnea that is:
  - Progressive
  - Usually worse with exercise
  - Persistent
- Chronic cough
  - May be intermittent
  - May be unproductive
- Chronic sputum production
  - Any pattern of chronic sputum production may indicate COPD
- History of exposure to risk factors
  - Tobacco smoke
  - Occupational dusts and chemicals
  - Smoke from home cooking and heating fuel
- Family history of COPD

Source: Adapted from GOLD 2015[2]

Anxiety and depression are present in 10% to 42% of patients with COPD.[24,25] Patients with COPD should be screened for anxiety and depression. When present, these coexisting conditions should be recognized and treated. (See PALTmed's clinical practice guideline on depression.[b])

TABLE 3
Differential Diagnosis of Asthma and COPD*

Asthma
- Onset early in life (often in childhood)
- Symptoms vary from day to day
- Symptoms worse at night/early morning
- Allergy, rhinitis, and/or eczema also present
- Family history of asthma

COPD
- Onset in midlife
- Symptoms slowly progressive
- History of smoking or exposure to other types of smoke
- Dyspnea during exercise

Heart failure
- Chest X-ray shows dilated heart, pulmonary edema
- Pulmonary function tests indicate volume restriction, not airflow limitation

*Less common illnesses include bronchiectasis, tuberculosis, obliterative bronchiolitis, and diffuse panbronchiolitis.

Source: Adapted from GOLD 2015[2]

STEP 3

Assess the severity of the patient's COPD. Assessment of the severity of COPD guides treatment planning and is important for measuring improvement. Typically, the disease is classified as mild, moderate, severe, or very severe (Table 4). Disease severity as determined by pulmonary function testing, however, does not necessarily correlate with functional capacity and subjective sensations of breathlessness. How COPD impacts an individual patient may best be understood by combining symptomatic assessment with the patient's spirometric classification and risk of exacerbations. The GOLD guidelines present a combined COPD assessment that places patients into four groups: A, B, C, and D.[2] These are described in Table 5.

Tests and symptom scales are used to establish a baseline and to follow the effect of therapy. The 6-minute walk test is a reproducible measure of the level of everyday impairment and exercise tolerance. The test measures the distance a patient can walk in 6 minutes on flat terrain. Trained

[b] PALTmed. Depression Clinical Practice Guideline. Columbia, MD.

therapists should administer the test in conjunction with pulse oximetry to monitor oxygenation levels and changes that may occur with ambulation; patients should be monitored carefully for oxygen saturation less than 90% and should be halted if oxygen saturation falls below 88%. (CMS criteria require SPO_2 of 88% or below for O_2 prescription.) The walk test may not be practical or appropriate for patients with severe pain, orthopedic, or other functional limitations. In these patients, a symptom scale such as the Borg Scale of Perceived Exertion (see Appendix 1) for obtaining patient perception of shortness of breath may be more appropriate.[26]

In patients who demonstrate hypoxemia with activity or during the 6-minute walk test and require supplemental oxygen therapy, a second assessment at rest and with exertion using oxygen is recommended to ensure that adequate oxygen saturation levels above 90% have been achieved. When oxygen is applied or setting levels are changed, allowing for a 5- to 10-minute period of equilibration between reassessments when possible is recommended.[27-30]

Prognosis. The disease trajectory in COPD is usually marked by a gradual decline in health status and increasing symptoms punctuated by acute exacerbations (an acute change in baseline dyspnea, cough, or sputum beyond day-to-day variability that is sufficient to warrant a change in therapy). Exacerbations of COPD become more frequent as the disease progresses. Frequent exacerbations increase mortality risk and may help clinicians determine which patients are more likely to die from COPD.[31]

Long-term prognosis after hospitalization for COPD exacerbation is poor, with a 5-year mortality rate of about 50%.[2] Mortality statistics for patients admitted with COPD exacerbations vary and depend on age, functional status, comorbidities, and certain physiologic variables including hypoxia and hypercapnia. Progressive respiratory failure, cardiovascular disease, malignancies, and other diseases are the primary cause of death in patients with COPD hospitalized for an exacerbation.[2]

It is difficult to determine life expectancy with precision for a given individual with COPD. However, population studies highlight important prognostic factors. The BODE (body mass index, airflow obstruction, dyspnea, and exercise capacity) Index for COPD survival prediction incorporates the FEV1, a measure of pulmonary function impairment; the modified Medical Research Council (mMRC) dyspnea scale score (Table 6); the distance walked in 6 minutes; and body mass index (BMI). The latter two reflect in part systemic manifestations of COPD. A higher BODE score predicts an increased risk of death from COPD.[32] The best prognostic factor in COPD patients receiving long-term oxygen therapy may be pulmonary artery pressure. In one study of prognostic factors, pulmonary artery pressure was a better indicator of prognosis than FEV1 and the degree of hypoxemia or hypercapnia.[33]

It may be appropriate to consider palliative care or hospice for some patients with more advanced COPD. National Hospice and Palliative Care Organization (NHPCO) guidelines for admission to hospice for COPD include cor pulmonale, PO_2 less than 55 mmHg while on oxygen, albumin less than 2.5 g/dL, weight loss of more than 10%, progression of disease, and poor functional status. However, these criteria may have a limited role in predicting 6-month mortality.[34]

TABLE 4

Stages of COPD Based on Airflow Limitation

Grade 1 – Mild

- Mild airflow limitation (FEV1/FVC less than 70%; FEV1 greater than or equal to 80% predicted)
- Sometimes, but not always, chronic cough and sputum production

Grade 2 – Moderate

- Worsening airflow limitation (FEV1/FVC less than 70%; FEV1 greater than or equal to 50% but less than 80% predicted)
- Shortness of breath, typically developing on exertion

Grade 3 – Severe

- Further worsening of airflow limitation (FEV1/FVC less than 70%; FEV1 greater than or equal to 30% but less than 50% predicted)
- Greater shortness of breath
- Reduced exercise capacity
- Repeated exacerbations

Grade 4 – Very Severe

- Severe airflow limitation (FEV1/FVC less than 70%; FEV1 less than 30% predicted)
- Quality of life very appreciably impaired
- Exacerbations may be life threatening

FEV1: forced expiration volume in 1 sec; FVC: forced vital capacity

Source: Adapted from GOLD 2015[2]

TABLE 5

Combined COPD Assessment That Includes Symptoms, Dyspnea, Spirometry, and Risk of Exacerbations

Patient Group A: Low Risk, Fewer Symptoms
- Grade 1 or 2 (mild or moderate airflow limitation) *and/or*
- 0 to 1 exacerbations per year *and* no hospitalizations for exacerbation *and*
- CAT score less than 10 *or* mMRC grade 0 to 1

Patient Group B: Low Risk, More Symptoms
- Grade 1 or 2 (mild or moderate airflow limitation) *and/or*
- 0 to 1 exacerbations per year *and* no hospitalizations for exacerbation *and*
- CAT score of 10 or more *or* mMRC grade of 2 or more

Patient Group C: High Risk, Fewer Symptoms
- Grade 3 or 4 (severe or very severe airflow limitation) *and/or*
- 2 or more exacerbations per year *or* 1 or more with hospitalization for exacerbation *and*
- CAT score less than 10 *or* mMRC grade 0 to 1

Patient Group D: High Risk, More Symptoms
- Grade 3 or 4 (severe or very severe airflow limitation) *and/or*
- 2 or more exacerbations per year *or* 1 or more hospitalization for exacerbation *and*
- CAT score of 10 or more *or* mMRC grade of 2 or more

CAT: COPD Assessment Test;[35] mMRC: modified Medical Research Council Breathlessness Scale.

Source: Adapted from GOLD 2015[2]

TABLE 6
The Modified Medical Research Council (mMRC) Breathlessness Scale

Grade	Degree of Breathlessness Related to Activities
0	Not troubled by breathlessness except with strenuous exercise
1	Short of breath when hurrying or walking up a slight hill
2	Walks slower than most people of the same age or has to stop for breath when walking at own pace on level ground
3	Stops for breath after walking about 100 meters or after a few minutes on level ground
4	Too breathless to leave the house or breathless when dressing or undressing

Source: Adapted from ATS/ERS 2004[1]

STEP 4

Assess the stability of the patient's COPD. Patients with COPD should be assessed on admission and frequently during the course of care for worsening symptoms that may reflect acute exacerbation of their disease.[1] A history of the frequency and severity of prior exacerbations as well as knowledge of precipitating events can be helpful in evaluating the patient's stability. Acute change in mental status is particularly worrisome and warrants urgent medical evaluation. Acute exacerbations of COPD require urgent treatment to prevent respiratory failure. (See Step 14.)

STEP 5

Obtain input from all members of the interprofessional team. Within a reasonable period of time following admission or recognition of COPD, the interprofessional team should evaluate the patient's care, physical limitations, and overall quality of life. The time frame for performing this evaluation should be based on disease severity and the medical and psychosocial impact of COPD on the patient.

The evaluation should consider the patient's physical, cognitive, emotional, social, and spiritual functioning as well as associated comorbidities and the patient's and care team's expectations. These factors clearly define the goals of care, which may include the following:

- Reduce the frequency of acute exacerbations of COPD
- Maintain the patient's current level of functioning to the highest level possible
- Rehabilitate the patient and return him or her to the community
- Provide comfort care to a patient with a terminal or end-stage condition

The goals of treatment, relevant progress notes, admission evaluations, and recommendations of relevant team members should be included in the patient's medical record.

COPD is a complex chronic disease and treatment requires the input of multiple professionals in a well-organized manner. Integrated care programs—structured disease management and other programs—have been advocated for the primary management of COPD within the community, but

their impact on improving important disease outcomes is uncertain.[2] There is no medical evidence supporting the development of integrated care programs within PA/LTC facilities.

Quality of life. Measurement of quality of life in the PA/LTC setting is an emerging concept. Although the domains of greatest importance to patients, family members, and staff have been identified,[36] no validated or recommended tools designed specifically for patients in the PA/LTC setting exist. In COPD, lung function does not reliably predict quality of life, but other tools may be relevant. The Breathing Problems Questionnaire is a reliable tool for measuring quality of life in the elderly population.[37] Although not studied specifically in the PA/LTC population, the COPD assessment test (CAT) is a simple questionnaire that measures the impact of COPD on quality of life.[35] It has been used in both stable outpatients and to follow patients response to pulmonary rehabilitation after exacerbations.[38]

STEP 6

Assess the patient's functional status. This should be done at baseline, quarterly, and following an acute exacerbation, or when comorbid disease is present. Practitioners should assess function during routine visits. Consider the reasons for the patient's impaired function when deciding whether the patient would benefit from restorative nursing or from specific rehabilitation interventions (e.g., speech-language pathology, pulmonary rehabilitation, physical or occupational therapy). Medical causes of activity intolerance may affect a patient's ability to tolerate an exercise program and may indicate a primary need for medical treatment.

STEP 7

Summarize the patient's condition. The practitioner's written summary of the patient's medical condition should:

- Describe the patient's medical conditions and stability, including control of COPD and severity of associated complications.
- Assess the impact of COPD on the patient's functioning and quality of life.
- Where relevant, explain why other suspected diagnoses were not pursued (e.g., patient is too frail, has a terminal condition, is unwilling to undergo further interventions, or further evaluation is not consistent with the plan of care based on the patient's or family's wishes).
- List applicable treatments for the patient's COPD and coexisting medical conditions. Give reasons for recommending the use or nonuse of identified treatment options in the patient, considering his or her overall state of health, advance directives, and preferences.

TREATMENT

Because COPD is by definition a chronic disorder that is only partially reversible, complete resolution of symptoms and reversal of damage are not realistic goals of treatment. It is usually possible, however, to significantly improve shortness of breath with activity and physical endurance, thus improving patients' quality of life. Management of COPD has three components:

- Prevention of additional lung damage
- Prevention and management of acute exacerbations
- Optimization of current lung function

Surgical interventions to treat COPD are usually not considered in the PA/LTC setting because of the limited life expectancy and comorbidities of most patients in this setting. For this reason, these options are not addressed in this guideline.

STEP 8

Develop an individualized care plan and define treatment goals. The treatment of COPD should be individualized and be medically realistic, taking into account the patient's severity of disease, comorbidities, prognosis, life expectancy, and treatment preferences, including those expressed in advance care directives. In general, however, the following treatment goals are appropriate for most patients with COPD:

- Educate the patient and family or other caregivers on self-management of COPD, including the elimination of cigarette smoking
- Ensure that the patient's influenza and pneumococcal immunizations are up-to-date (See Step 12)
- Avoid aggravating factors (e.g., bronchial irritants, potentially harmful medications, secondhand smoke) (See Appendix 2)
- Treat and manage hypoxemia. (See Step 11)
- Prevent acute exacerbations and initiate rapid treatment when signs or symptom changes are recognized
- Reduce cough, secretions, and shortness of breath by implementing effective therapies.
- Avoid the use of costly, non–evidence-based treatment options
- Relieve any reversible airway obstruction
- Treat and, to the extent possible, prevent infection
- Manage depression and anxiety
- Maximize activity and exercise tolerance (See Step 10)
- Achieve or maintain normal weight
- Promote effective smoking cessation therapies (See Step 9)
- Address complications (e.g., heart failure, polycythemia, severe hypoxemia)

The practitioner, nursing staff, and respiratory therapist, as available, with input from other appropriate disciplines, should coordinate development of the care plan, which should incorporate the patient's individual goals and preferences. The patient's acceptance of and participation in the treatment plan are important. The practitioner's orders should reflect key components of the care plan (e.g., smoking cessation, exercise, bronchodilator and other therapy).

Establish both short- and long-term goals that address the patient's disease severity, risk factors, and overall prognosis. The patient and/or family member (or surrogate decision maker) should be involved in this process to ensure that the patient's wishes and values are incorporated into the care plan. The

care plan should also document and communicate the goal level of physical function, as well as the limitations contributing to reduced ambulation and other functional abilities (e.g., severe dyspnea, hypoxemia, musculoskeletal limitations).

STEP 9

Implement facility-wide programs and policies to encourage smoking cessation. Smoking cessation, with continued abstinence, is the single most effective way to improve outcomes for patients at all stages of COPD, from asymptomatic to very severe.[39] The amount and duration of smoking, the extent of parenchymal and airway inflammation, and the degree of permanent structural damage likely determine the level of function of patients with COPD after smoking cessation. Even in the setting of established COPD, however, smoking cessation may reduce the rate of functional loss.[40] In fact, to date, only smoking cessation has been definitely shown to effectively reduce the rate of FEV1 decline.[14] According to the CDC, however, nearly half of people over the age of 40 with asthma or COPD continue to smoke.[41]

All PA/LTC facilities should be smoke-free and should provide ongoing education to both patients and staff about the adverse health effects of smoking. Facilities should partner with other health care organizations in their communities to offer on-site smoking cessation counseling programs for patients, families, and staff. Resources are available from the National Center for Tobacco-Free Older Persons (http://www.tcsg.org/tobacco.htm).

Although facilities should adopt smoke-free policies and the care team and other staff should strongly encourage smoking cessation, many facilities are in transition, with new residents prohibited from smoking while existing residents are allowed to continue. Patients must be assured that they will continue to receive treatment regardless of their smoking behavior and that their autonomy and residents' rights will be respected.

Facilities adopt a variety of strategies to manage patients who continue to smoke. Patient safety must be taken into account. COPD patients who use supplemental oxygen, for example, are at increased risk of burn injury.[42] One strategy to ensure patient safety is to allow smoking at designated times only, with monitoring by staff. This approach may result in increased patient agitation between periods when smoking is permitted. Another approach may be to reframe smoking as a privilege, rather than a right. The assistance of clinical psychologists or psychiatrists may be helpful in developing appropriate behavioral management plans for patients who continue to smoke.

Clinical and other staff as well as family members and visitors should be aware that exposure to secondhand smoke may exacerbate COPD and cause relapse in individuals who are trying to quit smoking. Facilities should ensure that any designated smoking areas are sufficiently separated from nonsmoking patients, staff, and visitors. Staff and family members who smoke should be aware that their clothing will carry the odors and irritants of smoking, which will decrease the air quality of the patients in their direct care.

Health care providers are key to the delivery of smoking cessation messages.[2] Practitioner counseling, including repeated reinforcement, frequently makes the difference between successful and unsuccessful attempts to quit smoking.[2] When counseling alone is insufficient to help patients stop smoking, pharmacotherapy is recommended, unless contraindicated.[43] Counseling and medication are effective when used by themselves to treat tobacco dependence, but the combination of counseling and medication is more effective than either alone.[44] Studies of smoking cessation in the PA/LTC population are lacking; thus, the recommendations given here follow the evidence base established for patients living outside the institutional setting.

First-line and second-line pharmacologic interventions for smoking cessation are listed in Table 7. Numerous studies indicate that nicotine replacement therapy in any form (e.g., gum, lozenge,

nasal spray, oral inhaler, sublingual tablet, transdermal patch) reliably increases long-term smoking abstinence.[2] The period immediately following admission to a PA/LTC facility often offers a window for the initiation or the continuation of nicotine replacement therapy—for example, when patients are transferred from the hospital, where they were unable to smoke for the duration of their stay.

The antidepressant bupropion and the nicotinic receptor partial agonist varenicline are both approved by the Food and Drug Administration (FDA) for smoking cessation. Boxed warnings on these products highlight the risk of serious neuropsychiatric symptoms in patients using them (Table 8).[45]

TABLE 7
Pharmacologic Interventions for Smoking Cessation

First-line drugs*
- Nicotine replacement
  - Nicotine patch
  - Nicotine gum
  - Nicotine lozenge
  - Nicotine inhaler
  - Nicotine nasal spray
- Bupropion (sustained release)
- Varenicline

Second-line drugs†
- Nortriptyline
- Clonidine

*First-line drugs are all approved by the US FDA as smoking cessation aids and are recommended as first-line drugs by the 2008 PHS guideline.[44]

†Drugs classified as second-line by the 2008 PHS guideline showed evidence of efficacy in a systematic review but are not approved by the FDA as smoking cessation aids and have more concerns about potential adverse effects than first-line drugs.[44]

TABLE 8
Neuropsychiatric Symptoms That May Occur With the Use of Bupropion or Varenicline

Patients receiving bupropion or varenicline for smoking cessation should be closely monitored for development of any of the following symptoms:
- Agitation
- Behavior change
- Depressed mood
- Hostility
- Suicidal thoughts and behavior or attempted suicide

Source: US Food and Drug Administration[45]

STEP 10

Implement nonpharmacologic interventions. Patient education, nutrition, and exercise are important components of the nonpharmacologic management of stable COPD. In appropriate patients, pulmonary rehabilitation may be recommended. Although no high-quality evidence is available for those in PA/LTC, relaxation techniques and alternative therapies such as massage may also reduce patient anxiety associated with their disease and may improve quality of life.

Patient and Family Education. Informed patients are more likely to follow treatment plans and to seek early intervention during exacerbations. Better informed family members and caregivers should be able to better recognize changes in condition, which should prompt timely and appropriate care, as needed. A designated staff member should provide patient and family education; this should be followed by periodic reinforcement sessions. Educational materials developed for community-living patients can be adapted for the PA/LTC setting.[46]

Education for cognitively able patients and family members may include

- How to recognize changes in shortness of breath, cough, and sputum production
- The disease process and the expected outcomes of treatment
- Energy-conserving ways to perform ADLs
- Breathing exercises, such as pursed-lip breathing (see "Pursed-lip breathing" in the section on exercise)
- The rationale and value of pharmacologic and nonpharmacologic treatments with demonstrated effectiveness, including the use of oxygen therapy
- How to use inhalation devices for medication administration

Educating patients about how to manage their disease may reduce hospitalizations. A Cochrane review of 14 different trials showed a significant reduction in the probability of at least one hospital admission among patients receiving self-management education compared with those receiving usual care.[47]

Telehealth interventions have been advocated within PA/LTC environments but data from several studies reviewing this technology as applied in ambulatory settings have not to date shown significant benefits for those with COPD.[2]

REDUCING HOSPITALIZATIONS

Patient Education. Educating patients about how to manage their disease may reduce hospitalizations.

Nutrition. It is important for patients with COPD to maintain good nutrition and a healthy body weight. The additional energy required to promote normal breathing, and the occurrence of systemic inflammation in COPD, increase resting energy expenditure (REE) and the metabolic rate in these patients. This hypermetabolic rate created by COPD, coupled with the decreased appetite commonly seen in these patients, can lead to impaired nutritional status and weight loss.[48]

As many as 25% to 40% of noninstitutionalized COPD patients are undernourished.[49] Malnutrition in the form of undernutrition contributes to decreased quality of life, reduced physical exercise performance, increased risk for disease exacerbation, and increased mortality. Furthermore, low body weight and low fat-free mass are recognized as unfavorable prognostic factors in patients with COPD.[49]

The medical nutrition therapy provided to patients with COPD should focus on prevention and treatment of weight loss. Low to moderate quality evidence supports that nutritional support promotes significant gain in weight and fat-free mass among noninstitutionalized COPD patients, especially if they are malnourished.[2,50]

With the purpose of improving undernutrition in COPD patients, recommendations to boost the intake of high-calorie foods and supplements, fruits and vegetables, and intake of vitamins, amino acids, and unsaturated fatty acids are common practice. Limited research supports that providing 1.5 times caloric needs can contribute to weight increase in patients with COPD.[51] A diet high in calories (2,300 to 2,500 kcal/day) and protein (80 to 90 g/day) has also been reported to promote weight increase and improve respiratory muscle function.[52] As a whole, however, the research has produced varying results and evidence specific to PA/LTC is lacking. In general, the consumption of wholesome, nutrient-dense foods should be encouraged. The Evidence Analysis Library of the Academy of Nutrition and Dietetics outlines evidence-based interventions for the treatment of COPD patients.[53] These are summarized in the Appendix. See also the PALTmed CPG on Altered Nutritional Status. [c]

Vitamins C, D, and E have been extensively studied in relation to their effect on COPD. The available research supports that COPD patients are often deficient in vitamins C, D, and E; however, there is no agreement on whether the progression or aggravation of COPD could be averted with vitamin replacement therapy.[49] Consider a daily multivitamin for all older adults at risk for or with diagnosed malnutrition.

Enteral nutrition in combination with exercise and anabolic pharmacotherapy has the potential to improve nutritional status. However, there is limited evidence that noninstitutionalized COPD patients benefit from enteral nutrition per se. Frequent small amounts of oral nutritional supplements are preferred to avoid postprandial dyspnea and satiety and to improve compliance.[54]

The presence of COPD in PA/LTC patients is a high risk factor for aspiration pneumonia.[55] The healthy adult respiratory pattern during eating (exhalation, swallowing apnea, exhalation) is disrupted in terms of timing and pattern in individuals with stable moderate to severe COPD.[56-59] COPD patients are 13 times as likely to be diagnosed with gastroesophageal reflux,[60] and COPD patients with gastroesophageal reflux are 7 times as likely to experience COPD exacerbations[60] compared with those without gastroesophageal reflux. Although there are no high-quality studies available for those in PA/LTC, careful assessment and treatment by speech-language pathology for oropharyngeal dysphagia is clinically appropriate. Gastroesophageal reflux disease management should be optimized.

Patients who have difficulty chewing or swallowing may benefit from a speech-language pathology referral or a dental referral if the problem is related to dental caries, poor dental, or periodontal health. Practitioners and staff, in conjunction with the facility dietitian, should address these issues in the care plan and in periodic patient assessments.

Caregivers should closely observe patients with COPD for possible signs of nutritional deficits, such as weight loss, decreased BMI, fluid and electrolyte imbalance, and changes in general appearance. (See AMDA's clinical practice guidelines on altered nutritional status [d] and dehydration and fluid maintenance. [e])

Exercise. Breathlessness, muscle fatigue, and complaints of poor stamina hinder activity in COPD patients. Many patients are reluctant to engage in ADLs for fear of becoming short of breath and

[c] PALTmed. Altered Nutritional Status. Clinical Practice Guideline. Ordering information available at https://paltmed.org/products/copd-management-cpg.

[d] PALTmed. Nutritional Status Clinical Practice Guideline. Columbia, MD

[e] PALTmed. Dehydration and Fluid Maintenance Clinical Practice Guideline. Columbia, MD

uncomfortable. Some patients may experience anxiety or worsened feelings of depression, and some may experience panic when active, even at very low levels.

Comorbid illnesses in those with COPD may exacerbate symptoms of dyspnea and poor exertional endurance, especially in older adults. As a result, patients may become sedentary, resulting in further deconditioning, worsening symptoms, and diminished quality of life.

Almost all clinically stable patients with COPD, regardless of the extent of their disease, can benefit from the use of interventions that can improve exercise tolerance, including the use of pursed-lip breathing (see below). The benefits of exercise training include improving the oxidative capacity and efficiency of skeletal muscle. Exercise training may in turn reduce dynamic hyperinflation, which reduces the dyspnea experienced with exercise.[1] FEV1 is a good predictor of exercise tolerance.[14]

The numerous benefits of physical activity and exercise in older adults are well known.[61] In COPD, exercise provides both specific physiologic benefits, by helping muscles use oxygen more efficiently to improve functional capacity, and psychologic benefits, by helping to improve the patient's sense of well-being. The cardiorespiratory fitness benefits from participation in a physical activity program can be noted within a few weeks.

Maximizing independence in the performance of ADLs should be the primary goal of an exercise program for the patient with COPD in the PA/LTC setting. Aerobic exercise (riding a stationary bike or walking) and resistance exercise (lifting a weight with the arms or legs) can help to restore and maintain a patient's functional independence.[62] The exercise program should be tailored to the patient's functional capability and should focus on those muscle groups used in the performance of ADLs. Upper-extremity training is important because arm movement can increase dyspnea. Simple weight training or other resistance exercises strengthen the upper arms, shoulders, and legs. Simple activities performed frequently are preferable to more complex or more strenuous activities performed less frequently. Patients who have balance difficulties or limited endurance should not walk on a treadmill.

Begin an exercise program with input from the care team only when the patient's condition is relatively stable. Address chronic pain before beginning an exercise program. Terminate exercise if there is presense of fatigue, signs or symptoms of cardiac strain appear, or if moderate to severe dyspnea develops.[63,64] Persons with COPD frequently have coexisting cardiovascular abnormalities such as high blood pressure or coronary artery disease, and exercise is contraindicated in patients with unstable angina. The American College of Sports Medicine recommends a medically monitored exercise evaluation in persons with COPD to assess the patient's cardiac risk.[62] A patient's exercise program can then address their need for medical support and surveillance during exercise.

Breathing exercises. Breathing exercises may improve both the ability to exercise and the ability to breathe. Diaphragmatic breathing exercises strengthen the ventilatory muscles and improve dyspnea. In particular, inspiratory muscle training in individuals with COPD has proven beneficial in decreasing dyspnea and increasing exercise participation.[65] Expiratory muscle training appears to improve dyspnea[66] and elicits benefits on swallowing similar to the benefits of several pharyngeal dysphagia treatments.[67,68]

Pursed-lip breathing. This breathing technique teaches patients to inhale slowly through their nose and to exhale even more slowly through pursed lips. Exhaling against pursed lips retards exhalation, slows the respiratory rate, and results in patients taking deeper breaths to maintain their minute ventilation.[69] Slowing exhalation may also reduce airway resistance. This breathing pattern may improve ventilation/perfusion mismatching and has been shown with biofeedback guidance of pulse oximetry to help patients improve their oxygen saturation. Use of pursed-lip breathing techniques is recommended whenever patients experience dyspnea during exercise or activity and to recover from

activity. This breathing technique is best taught by respiratory therapists, although other rehabilitation specialists can also provide this training.

Pulmonary Rehabilitation. Pulmonary rehabilitation is considered the standard of care for the treatment of COPD.[2,70] As currently defined by the ATS/ERS, **pulmonary rehabilitation** is "a comprehensive intervention based on a thorough patient assessment followed by patient-tailored therapies that include, but are not limited to exercise training, education, and behavior change, designed to improve the physical and psychological condition of people with chronic respiratory disease and to promote the long-term adherence to health enhancing behaviors".[71] Pulmonary rehabilitation has been clearly demonstrated to reduce dyspnea, increase exercise capacity, and improve quality of life in individuals with COPD,[72] although the majority of research derives from the ambulatory care setting. In both inpatient and outpatient settings, pulmonary rehabilitation may prevent hospital readmissions.[73] Long-term, pulmonary rehabilitation may help to prevent exacerbations.[74]

REDUCING HOSPITALIZATIONS
PREVENTING EXACERBATIONS

Pulmonary rehabililtation may prevent hospital readmissions and may help to prevent exacerbations.

Evidence-based guidelines recommend pulmonary rehabilitation within 4 weeks of discharge from an acute exacerbation and in patients with stable COPD, including patients with very severe COPD.[2] The components of pulmonary rehabilitation include patient education, a comprehensive assessment with a review of symptoms such as cough and sputum production and shortness of breath, and a physical capacity and oxygenation assessment for the development of a supervised exercise program. Patients who can demonstrate the ability to learn should be provided with information about their lung disease, how and why to use pursed-lip breathing techniques, oxygen therapy, inhaled medication use techniques (if self-medicating), and how to ambulate safely.

Exercise is the strongest weighted pulmonary rehabilitation component with highly supported grade A evidence.[75] Outcomes in pulmonary rehabilitation have been well researched and demonstrate improvements in quality of life, exercise capacity (generally 6-minute walk distance), and dyspnea.[2,63,70,75]

Recent data suggest that significant inactivity in COPD is an independent risk factor for mortality and is associated with a faster decline in lung function.[63] Physical inactivity is common in COPD. Acute COPD exacerbations are considered to be a major contributor to skeletal muscle dysfunction, particularly of the lower limbs.[63] Deconditioning and reduced activity often occur with lung function decline, thus making disability more likely.

Growing support exists for initiating early ambulation during acute hospitalizations and in the home environment. The strongest evidence is found in exercise outcomes in ambulatory settings. Mobilization plans and exercise prescriptions should be developed with input from the care team.[63] Ambulatory programs of pulmonary rehabilitation support the inclusion of respiratory therapists, physical and occupational therapists, nurses, physicians, and psychology professionals. This approach may be even more important in the PA/LTC setting. Physical activity and exercise considerations for the PA/LTC setting are shown in Table 9.

TABLE 9

Pulmonary Rehabilitation: Physical Activity and Exercise Considerations for Post-Acute and Long-Term Care

Goals

- To improve physical activity tolerance and possibly strength
- To encourage and support use of pursed-lip breathing skills
- To support improved self-efficacy

Patient Selection

- Dyspnea upon exertion or activity
- Demonstrates the ability to safely exercise either with support (i.e., walker, cane) or from a seated position
- Appropriate rehabilitation potential – consider cognitive and neurologic status

Precautions

- Unstable cardiac concerns
- Balance impairments (fall risk)
- Chronic pain worsening with activity or the development of new acute pain

Timing

- Varies in each patient, when airway patency is optimized (i.e., following aerosolized bronchodilator use and secretion clearance)
- With optimal oxygenation above 90% at rest and with ambulation or activity

Expected Results

- Will vary with each patient
- Monitoring symptoms of breathlessness and muscle fatigue may help to advance activity level
- Shorter sessions that occur more frequently may be needed to achieve the targeted number of minutes per day
- Rest periods may be required
- Obtaining patient feedback is important

Admittedly, there are gaps in research, and there is no high-quality evidence available identifying which patients with COPD in the PA/LTC setting, based on the severity of their COPD as well as any accompanying comorbid conditions, have a greater likelihood of benefit from a component of pulmonary rehabilitation. However, pulmonary rehabilitation can be adapted for any individual with chronic respiratory disease.[63] In the absence of substantial study, supervised exercise and ambulation may be considered, provided it can be carried out safely and effectively and is individualized to the patient's needs. Pulmonary rehabilitation should be prescribed by a physician and should be modified on the basis of an individual PA/LTC patient's physical and mental abilities. Involvement and oversight by the physician is a Medicare requirement.

The recommended exercise components of a pulmonary rehabilitation program include exercise training for muscles of ambulation using both low and high intensity, strength training, and upper-

extremity endurance training.[75] Guidelines from the American College of Sports Medicine, the ATS/ERS, and the American Association of Cardiovascular and Pulmonary Rehabilitation all recommend walking or cycling endurance activities for locomotor muscles. Resistance training (preferably with the patient seated) may be carried out with bands or weights. Upper-limb endurance training should focus on the muscles used to perform daily activities. Adequate oxygenation above 90% with exercise is recommended.[2,63,70,75] Assessing dyspnea and muscle fatigue, the two most limiting symptoms in many COPD patients, is standard in most pulmonary rehabilitation programs and may be used to establish training levels and progression. A symptom scale such as the Borg Scale of Perceived Exertion (see Appendix 1) for obtaining patient perception of shortness of breath can be used to establish a baseline and to increase activity and endurance.[26] Using prescribed bronchodilators and pursed-lip breathing techniques is recommended. Secretion clearance prior to exercise should be considered in those with significant problems, although some research supports exercise as helping with secretion mobilization. The use of assistive aids for those with balance impairments and severe obstruction may be safer and helpful.

STEP 11

Prescribe supplemental oxygen therapy if appropriate. Oxygen therapy is a principal treatment for patients with severe COPD. Administration of oxygen for more than 15 hours a day to patients with chronic respiratory failure increases survival.[2] Evidence also exists that long-term oxygen therapy reduces hospitalizations[76] and has a beneficial impact on pulmonary hemodynamics, hematologic characteristics, exercise capacity, lung mechanics, and mental state.[1] In elderly patients, oxygen can improve performance on neuropsychiatric testing.[77]

REDUCING HOSPITALIZATIONS

Oxygen therapy. Administration of oxygen for more than 15 hours a day in patients with more severe COPD may reduce hospitalizations.

The goal of long-term oxygen therapy is to achieve an arterial oxygen pressure (PaO2) at rest of 60 mm Hg at sea level or arterial oxygen percent saturation (SaO2) of at least 90%, which will prevent tissue hypoxia.[1] According to GOLD,2 oxygen therapy for patients with COPD should be initiated if the following conditions are met (note that CMS criteria requires SPO2 of 88% or below for oxygen prescription):

- PaO2 is at or below 55 mm Hg or SaO2 is at or below 88%, with or without hypercapnia confirmed twice over a 3-week period [Recommendation based on limited randomized controlled trial data; level B] or
- PaO2 is between 55 mm Hg and 60 mm Hg or SaO2 is 88%, if there is evidence of pulmonary hypertension, peripheral edema suggesting CHF, or polycythemia (hematocrit over 55%) [Recommendation based only on consensus; level D]

Caregivers should be sensitive to the fact that patients on long-term oxygen therapy may become socially isolated and depressed owing to their lack of mobility. To enhance patients' mobility, use small, portable oxygen canisters or wheeled devices to transport the canisters. Also consider the use of four-wheeled walkers with seats, which in at least one study were shown to improve ambulation.[78]

Pulse oximetry. Pulse oximetry is useful for tracking or adjusting supplemental oxygen therapy[2] but must be used and interpreted correctly. Patient comorbidities may affect the measurement and interpretation of oxygen saturation in PA/LTC patients with COPD. In general, pulse oximetry is useful only in normotensive patients. Those with low flow states or those in shock often have poor peripheral perfusion, resulting in low tissue hemoglobin saturation and falsely depressed pulse oximetry readings.[f] Causes of low perfusion include the following:[79]

- Cardiac arrhythmias
- Heart failure
- Peripheral vascular disease
- Hypotension
- Hypothermia
- Smoking
- Medications

The impact of anemia on pulse oximetry assessment has been controversial. Anemia does not affect the accuracy of pulse oximetry measurement but can affect interpretation of pulse oximetry readings.[80] Nail varnish and cold extremities can cause falsely low readings.[f] Early studies indicated that skin pigmentation has no significant effect on the accuracy of pulse oximetry.[79] When initiating long-term oxygen therapy, consider checking pulse oximetry periodically during sleep. Continue this practice only if satisfied that it adds to the safety and efficacy of oxygen therapy at night.

STEP 12

Ensure that the patient is protected against respiratory tract infections. Patients with COPD are at risk for increased morbidity and mortality from respiratory tract infections. Vaccination can reduce both the incidence and severity of influenza and the severity of pneumococcal pneumonia. Influenza and pneumococcal vaccinations, both alone and in combination, may reduce hospitalizations and mortality. Well-matched influenza vaccine has been estimated to reduce pneumonia and influenza hospitalizations among long-stay LTC patients by more than 4%.[81] A Cochrane review reported that influenza vaccine significantly reduces the number of exacerbations in COPD patients.[82]

REDUCING HOSPITALIZATIONS
Influenza vaccine. Well-matched influenza vaccine may reduce hospitalizations in LTC patients.
REDUCING EXACERBATIONS
Influenza vaccine. A Cochrane review reported that influenza vaccine significantly reduces the number of exacerbations.

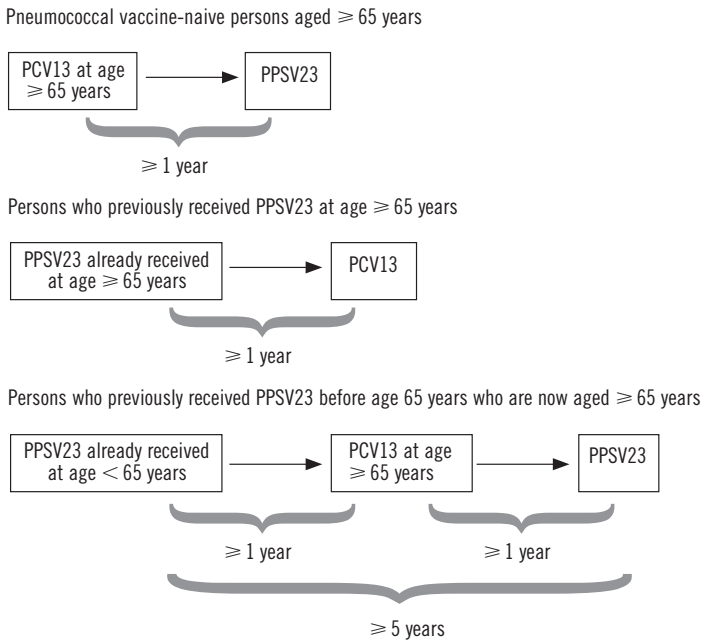
[f] PALTmed. Pulse oximetry: Its prevalence and purpose in the LTC setting. Caring for the Ages. https://paltmed.org/products/copd-management-cpg

Although pneumococcal vaccines may protect against morbidity, no significant effects on episodes of pneumonia or acute exacerbations in patients with COPD were shown in a Cochrane review.[83] (Please see PALTmed's clinical practice guideline on common infections[g] and tool kit on immunization in the LTC setting.[h])

Influenza vaccine is advised yearly for all individuals with COPD and for all patients in PA/LTC facilities. Outbreaks of influenza can be explosive and result in substantial morbidity and mortality among residents of such facilities, but evidence suggests that vaccination prevents respiratory illnesses during periods of influenza circulation for elderly nursing home residents.[84]

Pneumococcal vaccine is also advised for all COPD patients, regardless of age. See Figure 2 for current recommendations related to the administration of pneumococcal vaccination in those aged 65 years and older, which describes the recommendation for both 13-valent pneumococcal conjugate vaccine (PSV-13) and 23-valent pneumococcal polysaccharide vaccine (PPSV-23).[85] The Advisory Committee on Immunization Practices of the CDC recommends that both PCV-13 and PPSV-23 be administered routinely in series to all adults aged 65 years and older.[85] If unsure of a patient's vaccination status, it is safe to vaccinate provided the patient has no history of an allergic reaction to

Figure 2 Recommended intervals for sequential use of PCV13 and PPSV23 for immunocompetent adults aged 65 years and older, Advisory Committee on Immunization Practices, United States.



Abbreviations: PCV13 - 13-valent pneumococcal conjugate vaccine; PPSV23 - 23-valent pneumococcal polysaccharide vaccine.

Source: Kobayashi et al 2015[85]

[g] PALTmed. Common Infections in the Long-Term Care Setting. Clinical Practice Guideline. Columbia, MD.

[h] PALTmed. Immunization in the Long-Term Care Setting. LTC Information Series. Columbia, MD.

the vaccine. When a patient is admitted from an acute-care setting, facility staff should contact providers at the acute care setting to ask if the patient received an influenza or pneumococcal vaccination during his or her stay, unless that information is included within the documentation received by the facility staff.

STEP 13

Implement appropriate pharmacologic interventions. No existing medications for COPD have been shown to modify the rate of long-term decline in lung function.[2] Instead, the goals of pharmacologic therapy are to:

- Prevent or control symptoms
- Improve health status
- Improve exercise tolerance
- Prevent disease progression
- Prevent and treat exacerbations
- Decrease mortality

Guiding principles for pharmacotherapy in COPD are reviewed in Table 10.

The extent to which the severity of airflow limitation influences the severity of symptoms depends on factors such as the frequency and severity of exacerbations; the presence of complications, respiratory failure, and comorbidities; and the patient's general health status.[2] For this reason, medication regimens must be individualized based on the patient's preferences, comorbidities, prognosis, treatment goals, and life expectancy. One model that considers an individual patient's symptoms and future risk of exacerbations is the GOLD patient group model. In this model, as described in Table 5, patients are placed into 4 groups (A to D) according to symptoms and risk. Patients in the PA/LTC setting will most likely be in Groups B, C, and D but more likely in groups C and D. The high prevalence of advanced age (over 85 years), frailty, and multimorbidity in the PA/LTC population thus complicates COPD management in this setting.

TABLE 10
Guiding Principles for COPD Pharmacotherapy in the Post-Acute and Long-Term Care Setting

- Medications should be used in combination with nonpharmacologic approaches.
- Medications should be selected on the basis of adverse effect profiles and should be used at the lowest effective doses.
- Regular treatment with long-acting bronchodilators is more effective and convenient than regular treatment with short-acting bronchodilators.
- All patients should have access to a short-acting beta-2 agonist as needed for rescue therapy.
- Combining bronchodilators of different pharmacologic classes may improve efficacy and decrease the risk of adverse effects compared with increasing the dose of a single bronchodilator.
- The medication delivery system should be tailored to the patient's needs.
- Regular treatment should be maintained at the same level for long periods of time unless significant medication adverse effects occur or there is a need to revise management owing to progressive disease, including higher symptom burden and exacerbation history.
- Treatment tends to be cumulative, with more medications required as the disease state worsens.
- Patients and caregivers should be trained in the proper administration of inhaled medications.
- The patient's response to therapy and potential adverse effects should be carefully assessed with goals of therapy and treatment adjusted accordingly.

Source: Adapted from GOLD 2015.[2]

Pharmacologic Therapy for Stable COPD. All symptomatic patients merit a trial of drug treatment, with nonpharmacologic management (e.g., relaxation techniques, pursed-lip breathing, chest physiotherapy, nutritional intervention) provided as needed. The inhaled route of administration is preferred. The change in lung function after brief treatment with any drug does not help to predict other clinical outcomes.[1] Table 11 summarizes the frequently used medications in patients with COPD. Although the level of evidence and the strength of the recommendations supporting medication use for those with COPD are generally strong, as indicated within leading professional guidelines, the studies supporting these recommendations have typically not included PA/LTC patients or have not been done in PA/LTC settings. The statements and recommendations provided below are made for PA/LTC patients on the basis of the best available medical evidence reported for those with COPD.

Bronchodilators. A retrospective analysis of more than 126,000 nursing home residents suggested that bronchodilators, especially the long-acting forms, are underutilized in PA/LTC.[86] Four classes of bronchodilator therapy are available for clinical use: short- and long-acting anticholinergics, short- and long-acting beta-2 agonists, methylxanthines, and phosphodiesterase-4 inhibitors, with anticholinergics and beta-2 agonists used most commonly. The most important consequence of bronchodilator therapy appears to be airway smooth-muscle relaxation and improved lung emptying during tidal breathing.

Changes in FEV1 following bronchodilator therapy may be small but are often accompanied by larger changes in lung volume, which contribute to a reduction in perceived breathlessness. In

general, the more advanced the stage of COPD, the more important the changes in lung volume become relative to those in FEV1. The American College of Physicians provides an algorithm suitable for the clinical use of bronchodilators in the long-term care setting.[87]

Inhaled anticholinergic agents. Inhaled anticholinergic agents are the first-line maintenance therapy for COPD. Long-acting formulations are preferred over short-acting formulations.[2] The evidence is equivocal as to whether tiotropium offers greater benefit than long-acting beta-2 agonists in improving quality of life.[88] For many patients in the LTC setting, however, a long-acting inhaled anticholinergic, such as tiotropium, may be more suitable than a beta-2 agonist for regular use because of fewer cardiac adverse effects, less peripheral muscle tremor, and a duration of action of more than 24 hours. Compared with placebo, tiotropium has been shown to significantly improve patients' quality of life and reduce the risk of exacerbations.[89] Compared with ipratropium bromide (a short-acting anticholinergic), treatment with tiotropium was shown to be associated with improved lung function, fewer hospital admissions (including those for exacerbations of COPD), fewer exacerbations of COPD, and improved quality of life.[90] Aclidinium bromide, a newer long-acting anticholinergic agent, has also been associated with improved quality of life symptoms in moderate to severe COPD.[91] Also, the once-daily administration of a long-acting anticholinergic simplifies the drug administration process for LTC facility staff. Because oral inhalation of anticholinergic products may lead to dry mouth and possible systemic effects, patients should be encouraged to swish their mouths with a small amount of water and expectorate after each dose.

Therefore, for most patients with COPD in PA/LTC, a long-acting inhaled anticholinergic medication and/or a long-acting inhaled beta-2 agonist, supplemented by other medications as needed should be used for the maintenance treatment of bronchospasm associated with COPD (according to the GOLD patient groups most likely prevalent in PA/LTC). These agents are not indicated for the initial treatment of acute episodes of bronchospasm, for which short-acting agents can provide rescue therapy.

Inhaled beta-2 agonists. Beta-2 agonists (e.g., albuterol, arformoterol, formoterol, indacaterol, levalbuterol, olodaterol, pirbuterol, salmeterol) are as effective as anticholinergic agents in the treatment of COPD. However, these agents (especially at higher doses) may cause systemic adverse effects such as anxiety, arrhythmia, insomnia, tachycardia, and tremor. The rapid onset of short-acting beta-2 agonists makes them suitable for use as needed for immediate relief of symptoms.[64]

Compared with placebo, long-acting inhaled beta-2 agonists improve health status, possibly to a greater extent than short-acting anticholinergics; reduce symptoms and rescue medication use; and increase time between exacerbations. As previously noted, however, for many patients with COPD in the PA/LTC setting, tiotropium may be more suitable than beta-2 agonists for regular use because it has fewer cardiac adverse effects, causes less peripheral muscle tremor, and has a duration of action of more than 24 hours.[92]

The long-acting beta-2 agonists indacaterol, olodaterol, salmeterol, formoterol, and arformoterol are indicated as maintenance medications and should never be used as rescue medications.[64] Agents in this class have been associated with a small but significant increase in asthma-related deaths.[93] The relevance of this finding to elderly patients receiving these medications for the treatment of COPD is unknown.

Oral methylxanthines. Little evidence exists to support the use of methylxanthines in the management of COPD.[43,94,95] Theophylline is less effective and less well tolerated than long-acting bronchodilators and is not recommended if those drugs are available and affordable.[2] Beta-2 agonists and anticholinergics are preferred and their use must be optimized before considering methylxanthines.

Low-dose theophylline reduces exacerbations in COPD patients but does not increase post-bronchodilator lung function.[2] Although higher doses of theophylline are effective bronchodilators in COPD patients, inhaled bronchodilators are preferred in elderly patients because theophylline's toxicity is dose related and clearance of the drug declines with age.[2]

Older adults are at greater risk for toxicity from theophylline because of other chronic diseases (such as CHF) and concomitant drug use. Adverse effects of theophylline include diarrhea, tremor, nervousness, mental status changes, cardiac arrhythmias, myocardial infarction, and seizures.[96] Careful observation is particularly important in elderly persons and in the presence of comorbid conditions or interacting drugs. Methylxanthines have significant interactions with commonly used medications such as digitalis and coumadin.[2] Furthermore, medications such as cimetidine, ciprofloxacin, and erythromycin may increase blood levels of theophylline, whereas carbamazepine, ketoconazole, and phenytoin may decrease them.

Combinations of bronchodilators. Although monotherapy with long-acting beta-2 agonists appears to be safe, consider combining bronchodilators with different mechanisms and durations of action, which may provide benefit in COPD patients with frequent exacerbations or ongoing symptoms. This combination may increase the degree of bronchodilation with equivalent or fewer adverse effects. The ACP, ACCP, ATS, and ERS suggest that clinicians administer combination inhaled therapies (long-acting inhaled anticholinergics, long-acting inhaled beta-2 agonists, or inhaled corticosteroids) for symptomatic patients with stable COPD and FEV1 less than 60% predicted.[20] The combination of an anticholinergic and a beta-2 agonist may produce additional improvements in lung function and health status.[2]

Combining short-acting bronchodilator agents (e.g., albuterol plus ipratropium) produces a greater favorable change in spirometry than giving either agent alone. Combining long-acting beta-2 agonists and the short-acting anticholinergic ipratropium leads to fewer exacerbations than using either drug alone.[1] A Cochrane review concluded that a combination of the long-acting anticholinergic tiotropium and a long-acting beta-2 agonist resulted in a small mean improvement in health-related quality of life compared with tiotropium alone.[97]

Glucocorticosteroids. Inhaled glucocorticosteroids. Regular treatment with inhaled glucocorticoids improves symptoms, pulmonary function, and quality of life and reduces the frequency of exacerbations.[98] Studies comparing inhaled corticosteroids with long-acting beta-2 agonists have demonstrated similar benefits for most outcomes.[98] Inhaled glucocorticoids are associated with an increased risk of pneumonia and therefore are generally considered an adjunct to long-acting beta-2 agonists or long-acting anticholinergics in patients with advanced COPD and repeated exacerbations.[98,99] Given the possibility of an increased risk of pneumonia, the minimum effective dose of inhaled corticosteroid should be prescribed.[100] Because oral inhalation of steroid products may lead to oral thrush, patients should be encouraged to swish their mouths with a small amount of water and expectorate after each dose.

The benefits of inhaled corticosteroids must be balanced against the possible risk of serious adverse pneumonia events.[99] Although inhaled corticosteroids are typically safe for short-term use, concerns have been raised about increased risk of pneumonia in long-term users of these medications. Recent studies suggest an increased risk of pneumonia with use for more than 24 weeks, but without an increased risk of mortality.[100]

Combination inhaled glucocorticosteroid/bronchodilator therapy. It is unclear whether the addition of an inhaled corticosteroid improves overall outcomes compared to monotherapy with a long-acting

beta-2 agonist and/or long acting anticholinergic. Although a recent meta-analysis found that combination therapy resulted in lower exacerbation rates, improved lung function, and improved health status, the quality of evidence supporting the relative benefit of the combination was low.[2,101] An inhaled glucocorticosteroid may be considered in addition to a long-acting bronchodilator and/or long-acting anticholinergic if the patient has had one or more exacerbations requiring treatment with antibiotics or oral glucocorticosteroids within the past year.

Patients with COPD treated with combination therapy including inhaled corticosteroids have a higher incidence of lower respiratory tract infections, including pneumonia, than do patients treated with long-acting beta-2 agonists alone.[101] A study investigating the withdrawal of inhaled corticosteroids in patients with severe COPD receiving tiotropium and salmeterol found no significant difference in the number of exacerbations between the withdrawal group and the group that continued inhaled corticosteroids.[102]

Short-term oral glucocorticosteroids. Systemic corticosteroids (oral or intravenous) have been shown to shorten recovery time, decrease length of stay, and reduce the likelihood of treatment failure and relapse when used to treat acute exacerbations of COPD.[103,104] Use of systemic corticosteroids for COPD exacerbations may improve lung function (FEV1) and arterial hypoxia (PaO2).[2]

Although no consensus exists on specific dosing strategies, data suggests shorter courses of 5 to 7 days may be noninferior to the standard 10 to 14 days and may significantly reduce corticosteroid exposure.[105] The GOLD 2015 guidelines recommend prednisone 40 mg per day for 5 days[2] but acknowledge the data is insufficient to provide conclusions regarding the optimal duration of therapy for acute exacerbations of COPD. The Reduction in the Use of Corticosteroids in Exacerbated COPD (REDUCE) study results showed in patients with exacerbations requiring hospital admission, a 5-day treatment course of 40 mg of prednisone daily is noninferior to a 14-day treatment course with respect to re-exacerbation.[106] Nebulized budesonide may be considered for acute exacerbations, although it is more expensive. In a multi-center, double blinded, randomized, placebo-controlled trial, oral prednisolone was compared to nebulized budesonide in patients with an acute exacerbation of COPD, and both improved airflow compared with placebo. The difference in FEV1 was insignificant, but budesonide had less systemic activity than did prednisolone.[107]

Oral therapy with glucocorticosteroids is preferable to parenteral therapy.[108] Parenteral administration has a higher incidence of adverse effects than does oral administration.[104] (See Step 14.) Prednisolone is the active metabolite of prednisone but there are no significant differences between the two oral formulations in peak prednisolone levels, time of peak levels, or half-life.[109]

Long-term oral glucocorticosteroids. On the basis of the lack of evidence of benefit and the large body of evidence on adverse effects, long-term treatment with oral glucocorticosteroids is not recommended in COPD patients.[2,110] Treatment with long-term oral glucocorticosteroids may be reasonable in carefully selected patients, such as those with advanced dementia who are unable to use any kind of inhaled therapy. However, an adverse effect of long-term use of systemic corticosteroids is steroid myopathy, which contributes to muscle weakness, decreased functionality, and respiratory failure, especially in patients with severe COPD.[2] Patients who receive long-term glucocorticoid therapy should be monitored for osteoporosis and receive treatment as appropriate.[111]

TABLE 11
Classes of Medication Used to Treat COPD*

Drug Class	Drug Name and Description	Usual Dosing in Elderly	Include in Emergency Box?†,§	Include in Contingency Box?‡,§
Acute Exacerbations of COPD				
Inhaled short-acting **β-2 agonists,° MDI** (short-acting β-2 agonists are preferred initial therapy)	**Albuterol**	1-2 inhalations every 4-6 h	Yes	Yes
	Pirbuterol	1-2 inhalations every 4-6 h	No	No
	Levalbuterol	1-2 inhalations every 4-6 h	No	No
Inhaled short-acting **β-2 agonists, for nebulization** (short-acting β-2 agonists are preferred initial therapy)	**Albuterol,** 2.5 mg (3 mL of 0.083% solution), premixed with diluent	3 mL TID-QID	Yes	Yes
	Albuterol, 2.5 mg (0.5 mL, solution not premixed) with 2.5 mL normal saline	3 mL TID-QID	Optional, based on formulary coverage	Optional, based on formulary coverage
	Levalbuterol, 0.63 mg/3 mL, premixed with diluent	3 mL TID (every 6-8 h)	Optional, based on local usage pattern and formulary coverage	Optional, based on local usage pattern and formulary coverage
Inhaled short acting **anticholinergic MDI,** with or without short-acting **β-2 agonist** (anticholinergics can be added to short-acting β-2 agonist therapy if inadequate response)	**Ipratropium**	2-3 inhalations QID	Yes	Yes
	Ipratropium/Albuterol	1, 2 or 3 inhalations QID based on individual agent	No	No
Inhaled short-acting **anticholinergic,** for **nebulization** (anticholinergics can be added to short-acting β-2 agonist therapy if inadequate response)	**Ipratropium,** 500 mcg (2.5 mL of 0.02% solution), premixed with diluent	2.5 mL TID-QID (every 6-8 h)	Yes	Yes

TABLE 11 Continued
Classes of Medication Used to Treat COPD*

Drug Class	Drug Name and Description	Usual Dosing in Elderly	Include in Emergency Box?†,§	Include in Contingency Box?‡,§
Inhaled short-acting **anticholinergic and** short-acting **β-2 agonist** combination, for nebulization	**Ipratropium/Albuterol** (3 mL premixed solution)	3 mL QID	Yes	Yes
Oral **corticosteroids**	**Prednisone**	40 mg PO daily for 5 days	Yes	Yes
Inhaled **corticosteroid,** for **nebulization** (may be used for non-acidotic exacerbations, in patients unable to take medications PO)	**Budesonide** inhalation suspension, 0.5 mg per inhalation	3 inhalations QID for 7-10 d	No	No
Chronic Therapy for Stable COPD				
Inhaled long-acting **anticholinergic**, **DPI** or **MDI** (long-acting agents preferred over short-acting)	**Glycopyrrolate**	1 capsule (15.6 mcg) inhaled twice daily	No	No
	Tiotropium DPI	1 inhalation daily	No	No
	Umeclidinium DPI	1 inhalation daily (62.5 mcg)	No	No
	Aclidinium MDI	1 inhalation (400 mcg) twice daily	No	No
Inhaled long-acting **anticholinergic DPI** and a long-acting acting β-agonist	**Indacaterol/ Glycopyrrolate**	1 capsule inhaled twice daily	No	No
Inhaled long-acting **β-2 agonists, DPI** (long-acting agents preferred over short-acting)	**Formoterol DPI**	1 inhalation (12 mcg) every 12 h	No	No
	Salmeterol DPI	1 inhalation (50 mcg) every 12 h	No	No
	Indacaterol	1 inhalation daily	No	No
	Olodaterol	2 inhalations once daily	No	No

TABLE 11 Continued
Classes of Medication Used to Treat COPD*

Drug Class	Drug Name and Description	Usual Dosing in Elderly	Include in Emergency Box?†,§	Include in Contingency Box?‡,§
Inhaled short-acting **anticholinergic, MDI**	**Ipratropium**	See *Acute Exacerbations* section	See *Acute Exacerbations* section	See *Acute Exacerbations* section
Inhaled short-acting **β-2 agonists, MDI**	**Albuterol** **Pirbuterol** **Levalbuterol**	See *Acute Exacerbations* section	See *Acute Exacerbations* section	See *Acute Exacerbations* section
Inhaled short-acting **anticholinergic** and short-acting **β-2 agonist** combination, **MDI**	**Ipratropium/Albuterol**	See *Acute Exacerbations* section	See *Acute Exacerbations* section	See *Acute Exacerbations* section
Inhaled long-acting **β-2 agonist,** for **nebulization**	**Formoterol**	2 ml (20 mcg) twice daily	No	No
	Arformoterol	2 ml (15 mcg) Q 12 H	No	No
Inhaled short-acting **anticholinergic,** for **nebulization**	**Ipratropium**	See *Acute Exacerbations* section	See *Acute Exacerbations* section	See *Acute Exacerbations* section
Inhaled short-acting **β-2 agonists,** for **nebulization**	**Albuterol** **Levalbuterol**	See *Acute Exacerbations* section	See *Acute Exacerbations* section	See *Acute Exacerbations* section
Inhaled short-acting **anticholinergic** and short-acting **β-2 agonist,** combination product for **nebulization**	**Ipratropium/Albuterol** (3 ml premixed solution)	3 ml QID	No	No
Inhaled long-acting **anticholinergic DPI** and a long-acting **β-2 agonist**	**Tiotropium/Olodaterol**	2 inhalations daily	No	No
	Umeclidinium/ Vilanterol	1 inhalation daily	No	No
Methylxanthines¶	**Theophylline SR** (sustained release)	100 – 300 mg PO BID	No	No
	Theophylline SR	400 mg PO daily	No	No

TABLE 11 Continued
Classes of Medication Used to Treat COPD*

Drug Class	Drug Name and Description	Usual Dosing in Elderly	Include in Emergency Box?†,§	Include in Contingency Box?‡,§
Inhaled **corticosteroids, MDI** or **DPI** (for patients with severe COPD and repeated exacerbations, ADDED TO routine bronchodilator therapy)	**Beclomethasone dipropionate** MDI, 40 mcg/Inhalation	1-2 inhalations BID	No	No
	Triamcinolone acetonide MDI	2-4 inhalations 2-4 times daily (max of 15 inhalations daily)	No	No
	Flunisolide MDI	2-4 inhalations BID	No	No
	Fluticasone MDI, 44 mcg/ inhalation	2-4 inhalations BID	No	No
	Fluticasone DPI	2 inhalations twice daily	No	No
	Budesonide DPI, 180 mcg/ inhalation	1 inhalation twice daily	No	No
	Mometasone DPI	1 inhalation daily in the evening	No	No
Inhaled **corticosteroid,** for **nebulization**	**Budesonide** inhalation suspension, 0.5 mg per inhalation	1 inhalation daily	No	No

TABLE 11 Continued
Classes of Medication Used to Treat COPD*

Drug Class	Drug Name and Description	Usual Dosing in Elderly	Include in Emergency Box?†,§	Include in Contingency Box?‡,§
Inhaled **corticosteroid** and inhaled long-acting β-2 **agonist, combination DPI or MDI** (for patients with severe COPD and repeated exacerbations; may be in addition to routine inhaled anticholinergic therapy)	**Fluticasone/ salmeterol** DPI, 250 mcg/50 mcg	1 inhalation twice daily	No	No
	Fluticasone/Vilanterol DPI, one 100 mcg/25 mcg inhalation once a day	1 inhalation daily	No	No
	Fluticasone/ salmeterol MDI, 115 mcg/21 mcg	2 inhalations twice daily	No	No
	Budesonide/ formoterol MDI, 160 mcg/4.5 mcg	2 inhalations twice daily	No	No
	Mometasone/ Formoterol MDI	1 inhalation twice daily	No	No

DPI: dry powder inhaler; MDI: metered-dose inhaler.

*List is not all-inclusive (e.g., some older medications, such as metaproterenol, are not included, as their use is no longer considered standard of care for elderly patients).

†Emergency box is designed for use in a true emergency situation.

‡Contingency box (may have other descriptive names) contains a broader range of medications intended to support a medication delivery system in a PA/LTC facility.

§The scope of products permitted in an emergency or contingency box is frequently state-regulated. Readers should contact their state regulatory body and pharmacy partner to obtain appropriate state-specific guidance on the use of emergency and contingency boxes.

°Short-acting β-2 agonists should also be ordered on a PRN ("rescue") basis for both chronic stable and acute exacerbations of COPD (e.g., "albuterol inhaler 2 puffs PO every 4 h PRN shortness of breath" in addition to routine scheduled therapies).

¶Use of this class is not preferred in PA/LTC given the less favorable balance of benefits versus harms compared with other bronchodilator classes. (See text for additional information.)

Proper Use of Inhaled Medications. Inhaled medications can be delivered via jet or ultrasonic nebulizer, pressurized metered-dose inhaler (MDI), or dry powder inhaler (DPI). Short-acting beta-2 agonists delivered via DPI are not currently available in the United States; however, most are available in either nebulizer or MDI delivery systems. None of the long-acting bronchodilators are available in MDI form in the United States. Inhaler devices are equivalent in terms of efficacy and safety when used correctly.[112-115]

Nebulizers are significantly overused in the PA/LTC setting. For patients who have very low inspiratory rates, nebulizers may have theoretical advantages. However, there is little randomized trial evidence for their benefit over other devices.[2] Patients who are capable of using an MDI are frequently maintained on nebulizers. Some patients who transition from the hospital to a PA/LTC facility after an acute illness may initially need a nebulizer. However, this use often continues indefinitely because the patient's continuing need for a nebulizer is not reevaluated. Orders for nebulizer therapy should be evaluated when a patient is admitted to the facility and reevaluated periodically thereafter to ensure that treatment via this delivery system is still necessary.

The choice of device should be based on availability, clinical setting, the patient's ability to use the device correctly, drug administration time, convenience, economic constraints, and patient acceptability or preference.[113,116] For older adults, consideration should be given to physical and cognitive limitations which may interfere with correct inhalation technique. Correct use of any inhaler requires the patient to perform a number of steps and in the right order. Cognitive impairment is a major barrier to effective inhaler technique. Studies have demonstrated an association between the inability to learn inhaler technique and scores below 24 on the Mini Mental State Exam (MMSE) or the inability to draw intersecting pentagons.[117-119]

Poor inhaler technique can markedly reduce the amount of drug reaching the lungs.[120] When an inhaled medication appears to be ineffective, first ensure it is being properly administered before deciding to prescribe a different medication. Studies have shown only about 60% of older people use MDIs correctly;[121] this percentage decreases in frail elderly patients.[77]

The American Association for Respiratory Care recommends MDI and DPI delivery systems be the first choice for clinicians because of their convenience and lower cost.[122] The advantages and disadvantages of the different inhaler devices are shown in Table 12. MDIs require coordination of inspiration and inhaler activation, full exhalation, and slow continuous inhalation to ensure proper drug deposition in the lung. Spacers can compensate for many of the problems associated with MDI use.[121] The use of a spacer with the MDI improves coordination and reduces the oropharyngeal deposition of high-velocity sprays from the MDI.123 DPIs may be useful in patients who are unable to correctly use MDIs.[124] Although airflow limitation in some patients is a concern, studies suggest most patients are able to generate at least minimum, if not optimal inspiratory flow.[114]

It is critical that staff administering inhaled medications demonstrate competency to do so. Patients' ability to use their inhalers independently should also be evaluated. Patients who have demonstrated they can use and store their inhalers safely and correctly should be permitted to have access to a rescue inhaler if they wish. Patients who have rescue inhalers must be able to tell nursing staff when they used the inhaler and how many doses they took, so the nursing staff can note this in the medication administration record. Patients who self-administer rescue inhaler therapy should be re-assessed periodically and their refills monitored for overuse.

TABLE 12
Advantages and Disadvantages of Inhaler Devices

Type	Advantages	Disadvantages
MDI	Portable and compact Short treatment time No preparation No contamination risk High reproducibility between doses	Coordination of inspiration and actuation needed Most patients inhale too fast Inefficient lung deposition High oropharyngeal deposition The number of remaining doses may be difficult to determine Important to shake before use
Spacer	Less need for coordination than with an MDI Reduced oropharyngeal deposition compared to MDI Improved lung deposition Useful for acute exacerbations	Some patients find inhalation more complex and the delivered dose can be lower if not used correctly More expensive and less portable than MDI alone Spacer must be washed and allowed to dry Not preferred by patients
DPI	Breath-actuated and thus patient coordination not required No propellant Most have dose counters Short treatment time Small and portable	Some are single dose Some need to be shaken before use Needs a fast acceleration rate at the start of the inhalation Poor quality (or no) dose emitted if inhalation flow is too slow Uncertainty of dose emission during acute exacerbations Can result in high oropharyngeal deposition Must be upright when preparing the dose for inhalation Must be kept upright or turned horizontally for inhalation More expensive than MDIs Needs to be stored in a cool and dry place

Source: Adapted from Chrystyn 2009[120]

Effects of Other Medications in Patients with COPD. Anti-inflammatory agents. Phosphodiesterase-4 enzyme inhibitors (i.e., roflumilast) have been introduced to the market as an adjunctive therapy for the maintenance treatment of severe COPD associated with chronic bronchitis. These agents have no direct bronchodilatory effects and should always be used in combination with at least one long-acting bronchodilator.[2] Phosphodiesterase-4 inhibitors have been shown to be better than placebo for mild lung function changes and reducing the likelihood of exacerbations; however, they have little, if any, impact on quality of life.[125] Furthermore, emerging safety concerns over psychiatric adverse events will likely limit the use of these agents in PA/LTC patients.[125]

Although other anti-inflammatory agents are useful in treating asthma, these agents have a limited role in maintaining lung function in patients with symptomatic COPD. Specifically, agents such as nedocromil and leukotriene modifiers and anti-TNF agents have not been adequately tested in COPD patients and cannot be recommended.[2]

Antihistamines. First-generation antihistamines are highly anticholinergic and have been identified as potentially inappropriate medications (PIMs) in the 2015 AGS Beers Criteria for PIM Use in Older Adults.[126] Antihistamines promote drying of respiratory secretions and should be used cautiously owing to the risk of confusion, constipation, and other anticholinergic effects in patients with COPD. Avoid the use of sedating antihistamines.

Antitussives. Although sometimes a troublesome symptom, cough has a significant protective role in COPD. Routine use of antitussives in stable COPD is not recommended.[2]

Beta-blockers. Nonselective beta-blockers may produce bronchospasm in patients with airway disease. Many patients, however, tolerate beta-blockers with no exacerbation of pulmonary symptoms. In many situations (e.g., CHF or post myocardial infarction), the benefits of beta-blocker therapy outweigh the risks and burdens. The practitioner must individualize the decision to use these agents. Selective beta-blockers (acebutolol, atenolol, bisoprolol, esmolol, metoprolol, nebivolol) are preferred over nonselective agents in this class.[2]

Benzodiazepines. Systematic reviews have failed to support a role for benzodiazepines in the treatment of dyspnea.[127,128] Benzodiazepines may be helpful in some patients for anxiety related to respiratory symptoms but should be used judiciously because they pose a risk of respiratory depression and have other significant adverse effects, especially in the PA/LTC population. Benzodiazepines are listed as potentially inappropriate medications whose use should be avoided in the 2015 updated Beers Criteria.[126] Benzodiazepines may be helpful for patients receiving palliative care if benefit is deemed to outweigh risk.

Diuretics. Routine administration of diuretics for symptoms of COPD is not warranted and diuretics should be prescribed with caution. Hypokalemia may occur when beta-2 agonist treatment is combined with thiazide diuretics.[2] Overuse of diuretics may produce excessive volume depletion.

Decongestants. Many over-the-counter cough and cold medications contain decongestants (e.g., pseudoephedrine, phenylephrine). These agents can cause anxiety, palpitations, and tachyarrhythmias, as well as sleep difficulties, and should be used with caution in patients with COPD.

Mucolytics. Widespread or routine use of mucolytics to treat COPD is not recommended. In a Cochrane review, treatment with a mucolytic was shown to produce little difference in lung function compared with placebo and to have little or no effect on overall quality of life.[129] Although mucolytics may be helpful in a few patients with viscous sputum or in patients who are unable to take inhaled corticosteroids,[43] evidence suggests that overall they are of minimal benefit in patients with COPD.[2]

Opioids. Systematic reviews have concluded that opioids are effective for relief of dyspnea in patients with advanced COPD.[130,131] Because opioids have respiratory depressant effects, practitioners may be hesitant to use them to treat pain or dyspnea in patients with COPD. In recognizing patients with advanced lung or heart disease are not being effectively treated for dyspnea, the American College of Chest Physicians (ACP) developed a consensus statement on the management of dyspnea.[132] The ACP suggests opioids be dosed and titrated for relief of dyspnea. Cautious use of opioids entails appropriate monitoring for respiratory depression and other adverse effects. The risk of respiratory depression may be minimized by starting with a low opioid dose and titrating upward slowly as needed.

A review of the safety of opioids in severe respiratory disease concluded low-dose opioids were not associated with increased hospitalization or death in patients with severe COPD.[128,133] A study of morphine use for dyspnea control confirmed an initial dose of 2.5 mg of oral morphine given to severely ill patients (average age 67) did not cause respiratory depression.[134] If dyspnea is adversely affecting the quality of a patient's life despite optimization of COPD therapy and implementation of nonpharmacologic interventions, opioids are the most appropriate next step. The most studied and versatile medication for relief of dyspnea is morphine, although other opioids are also effective. Opioids can be administered via several routes (e.g., oral, sublingual, subcutaneous, intramuscular, intravenous, rectal). Nebulized delivery of opioids for dyspnea relief has a limited evidence base and is not recommended.[128,135] For patients experiencing dyspnea who are already receiving a stable dose of opioids, increasing the total daily opioid dose by 25% is usually effective.[128]

When prescribing opioids for dyspnea control, a reasonable monitoring plan includes assessing the patient's level of dyspnea, level of alertness, respiratory rate, and SaO2 before each dose. Patients should be asked to routinely and regularly rate the intensity of their breathlessness, if possible, to guide management and care, but there is no agreed upon tool to be used to measure breathlessness.[132] Because sedation always precedes respiratory suppression, consider holding the opioid dose if the patient cannot easily be aroused to his or her usual level of consciousness. It is also prudent to hold an opioid dose if the patient's respiratory rate is less than 10 breaths per minute when awake or if the patient requires more oxygen to maintain his or her usual level of oxygenation. Monitoring for respiratory depression is necessary for 24 to 48 hours after a stable dose of opioids has been established.

Palliative Care for COPD. Palliative care is not solely for patients in the final days or months of life; rather, it is "whole-person care for patients whose diseases are not responsive to curative treatment."[136] Palliative care is intended to "prevent and relieve suffering and to support the best possible quality of life for patients and their families, regardless of the stage of the disease or the need for other therapies."[137]

Highlighting the need for palliative care in patients with COPD, one study found patients with COPD experienced more physical, social, and emotional distress than did patients with inoperable lung cancer.[138] The foundation of dyspnea palliation for patients with COPD is to optimize the medical care of COPD. An ACP consensus statement on the management of dyspnea in patients with advanced lung disease suggests concerns about contributing to addiction or physical dependence should never limit effective treatment or palliation of dyspnea.[132] (See "Opioids" above.) Also consider nonpharmacologic interventions such as emotional support, relaxation techniques, and consultation

with speech-language pathologists and occupational and physical therapists for suggestions regarding breathing techniques, energy conservation, and positioning. (See PALTmed's LTC information tool kit, *Palliative Care in the Long-Term Care Setting*.[i]) Although there is no high-quality evidence supporting the practice, patients with dyspnea may benefit from fresh air flowing across their bed or face from an open window, a gentle fan, or a room air conditioner.[132] Although oxygen therapy is indicated for patients with hypoxemia, a trial of oxygen may also provide significant subjective relief for those with advanced COPD associated with dyspnea. There is no convincing evidence to support the use of supplemental oxygen in patients with advanced lung disease who are not hypoxemic.[132]

STEP 14

Treat acute exacerbations of COPD promptly. An exacerbation of COPD is "an acute event characterized by a worsening of the patient's respiratory symptoms that is beyond normal day-to-day variations and leads to a change in medication."[2] Acute exacerbations of COPD often follow upper respiratory tract infections and begin with dyspnea, followed by increased purulence and volume of sputum. Table 13 lists the signs and symptoms of an acute exacerbation.

In elderly patients, an acute exacerbation of COPD can be difficult to differentiate from new onset or worsening of a comorbid condition such as heart failure, pneumonia, or pulmonary thromboembolic disease.[2] Differential diagnosis of an acute exacerbation should follow the same process as differential diagnosis of COPD (see Step 2). Initial treatment should begin immediately without waiting for confirmation of the diagnosis.

TABLE 13
Signs and Symptoms of an Exacerbation of COPD

- Change in sputum color or thickness
- Chest tightness
- Delirium
- Fever
- Increased cough and sputum production
- Increased fatigue
- New-onset sleep difficulty
- Wheezing

Adapted from ATS/ERS 2004[1],GOLD 2015[2]

STEP 14.1

Recognize and report the acute exacerbation. Train nursing assistants to recognize and immediately report to a nursing supervisor any acute change of condition in a patient with COPD (including any change in baseline dyspnea, cough, sputum, or mental status beyond normal day-to-day variation). If a patient receiving oxygen experiences acute shortness of breath, the nursing assistant should check to

[i] PALTmed. Palliative Care in the Long-Term Care Setting. LTC Information Toolkit. Ordering information available at https://paltmed.org/products/copd-management-cpg

ensure that the oxygen machine has not been accidentally disconnected. The nursing assistant should also check the gauge on the oxygen machine at regular intervals to ensure that the machine has not run out of oxygen.

To comfort the patient with acute shortness of breath while waiting for the nurse or practitioner, the nursing assistant can hold the patient's hand, speak reassuring words, and (if the patient is in bed) raise the head of the bed. The nursing assistant can also encourage the patient in proper breathing techniques. Pursed-lip breathing may be beneficial. Placing a fan at the bedside can increase airflow to the nose and may also help to cool a patient who is overheating as a result of struggling for breath. Relaxation techniques may also be helpful in decreasing the patient's anxiety.

STEP 14.2

Implement initial treatment of the acute exacerbation, assess the severity of the episode, and contact the practitioner. Patients with COPD should have PRN orders for rescue medications (e.g., ipratropium, short-acting beta-2 agonists), which should be given as soon as an exacerbation is identified. The nurse should complete an assessment of the patient and contact the practitioner for further orders. The use of a protocol for physician notification[j] may be helpful when reporting a patient's symptoms to the practitioner by telephone. Table 14 provides an example of a "call sheet" that nurses may wish to use.

TABLE 14
Example of a Nursing Call Sheet

Condition	Physical Data	Medical History
Shortness of breath (dyspnea)	1. Check vital signs	1. Patient's age and sex
	2. Listen to the lungs	2. Onset of exacerbation (i.e., gradual, progressive, or abrupt)
	3. Assess for dyspnea, fever, pain, respiratory distress, tachypnea	3. If edema is present, was it gradual or abrupt?
	4. Perform pulse oximetry	4. What has been done so far to manage the situation?
	5. Assess for edema	5. Diagnoses
	6. Assess for change in weight	6. History of COPD/congestive heart failure
		7. Medications
		8. Allergies

Source: Adapted from PALTmed's *Protocols for Physician Notification*[j]

[j] PALTmed. Post-Acute and Long-Term Care Medical Association. Protocols for Physician Notification: Assessing Patients and Collecting Data on Nursing Facility Patients; A Guide for Nurses on Effective Communication with Physicians. Columbia, MD: 2000.

A medication review by the consultant pharmacist may indicate medications that may be contributing to the exacerbation of the patient's COPD. (See **Effects of Other Medications in Patients with COPD**, p. 39)

STEP 14.3

Treat the acute exacerbation. The practitioner should increase the dose and frequency of bronchodilator therapy in addition to any prescribed rescue regimen already ordered. Inhaled bronchodilators (particularly short-acting beta-2 agonists, with or without ipratropium) and systemic glucocorticosteroids are effective in treating acute exacerbations of COPD. For patients who are able to use an MDI, there is no significant difference in the clinical response between an MDI (with or without a spacer device) and a hand-held nebulizer.[2] A dose of 30 to 40 mg oral prednisone per day for 5 to 7 days is usually effective and safe in older persons. Higher doses are associated with significant adverse effects and their benefits are unclear (See Step 13). For patients who fail higher dose glucocorticoid therapy, have frequent exacerbations, or are on chronic steroids, a slower taper may be beneficial.[106] Table 15 outlines a recommended approach to the treatment of an acute exacerbation of COPD.

TABLE 15
Treatment of an Acute Exacerbation of COPD

Patient education
- Check inhalation technique
- Consider use of spacer devices

Bronchodilators
- Short-acting beta-2 agonist and ipratropium MDI with spacer or hand-held nebulizer as needed
- Consider adding long-acting bronchodilator if patient is not using one

Corticosteroids (actual dose may vary)
- Prednisone 40 mg for 5 days
- Consider using an inhaled corticosteroid, such as nebulized budesonide

Antibiotics
- May be initiated in patients with altered sputum characteristics
- Choice should be based on local bacterial resistance patterns
  - Amoxicillin/ampicillin, cephalosporins
  - Doxycycline
  - Macrolides
- If the patient has failed prior antibiotic therapy, consider
  - Amoxicillin/clavulanate
  - Respiratory fluoroquinolones

Source: ATS/ERS 2004;[1] GOLD 2015[2]

Consider additional diagnostic testing (e.g., chest x-ray, chemistry panel, complete blood count, electrocardiogram) to evaluate for precipitating events or associated conditions such as CHF or pneumonia. Referral to speech-language pathology may be indicated for assessment of the presence of oropharyngeal dysphagia and diet recommendations regarding texture and liquid viscosity.

On the basis of currently available evidence, antibiotics should be given when the patient with an acute exacerbation has[2]

- Increased sputum purulence with increased dyspnea and/or increased sputum volume or
- Requires mechanical ventilation.

Prescribe appropriate antibiotics for a limited period. The use of chronic systemic antibiotic therapy (prophylactic antibiotics to prevent acute exacerbation of COPD) is not recommended for patients with stable COPD[2,111]. A Cochrane review concluded that continuous antibiotics reduced exacerbations, but did not affect hospital admissions, mortality, or serious adverse events.[139] Macrolides may reduce exacerbations in patients with chronic COPD but harms may outweigh benefits.[140]

Consider the use of suctioning. Suctioning may increase the patient's comfort, but in some cases it may cause discomfort and increase shortness of breath. Patients who have an ineffective cough and cannot expectorate on their own may need assistance with suctioning. This can be accomplished with the use of a rigid curved tonsillar tip suction device attached to a portable suction machine. The patient may operate the device him- or herself or may require assistance by an attendant.

In a systematic review study of chest physiotherapy in COPD patients admitted to the hospital for acute exacerbation, walking programs were shown to have significant benefits.[141] No evidence was found showing the use of chest physical therapy to loosen secretions (chest percussion) had a significant effect on lung function, arterial blood gases, perceived level of dyspnea, or quality of life.

Assess oxygenation and provide controlled oxygen therapy as needed to try to maintain SaO2 greater than 90% (see Step 11). As a general principle, prevention of tissue hypoxia supersedes CO2 retention concerns. For the patient who is a known CO2 retainer, consider laboratory monitoring of CO2 levels.[1] Monitor nutrition and hydration closely and intervene as appropriate.

STEP 14.4

Decide whether the patient with an acute exacerbation of COPD should be hospitalized. Table 16 lists factors which may help to determine whether hospitalization is appropriate for an acute exacerbation of COPD. (Also see PALTmed's clinical practice guideline, Acute Change of Condition in the Long-Term Care Setting.[k])

STEP 14.5

When the acute exacerbation resolves, taper or discontinue medications prescribed to treat it. Oral corticosteroids may be indicated during an acute exacerbation of COPD, but in most instances these agents may be discontinued after 5 to 7 days of therapy. Adjust bronchodilator regimens as appropriate.

[k] PALTmed. Acute Change of Condition in the Long-Term Care Setting. Clinical Practice Guideline. Ordering information available at https://paltmed.org/products/copd-management-cpg.

TABLE 16
Is Hospitalization Appropriate? Factors to Consider

Patient factors

- Changes in mental status
- Diagnostic uncertainty
- Failure to respond to initial medical management
- Patient wishes as expressed in advance directives
- Inability to eat or sleep due to symptoms
- Marked increase in dyspnea or hypoxia unresponsive to oxygen and/or other therapy
- New arrhythmias or hemodynamic instability
- Overall prognosis and care goals (if receiving palliative or end-of-life care, hospitalization is probably inappropriate unless the only goal is improved symptom relief and this cannot be provided adequately in the current setting)[1]
- Persistent respiratory rate above 28 breaths per minute with labored respirations
- Presence of high-risk comorbid conditions (e.g., cardiac arrhythmia, congestive heart failure, diabetes mellitus, pneumonia, renal or liver failure) that requires additional management
- Worsening hypercapnia

Facility factors

- Assessment and/or monitoring needs not available within the facility
- Ability of the practitioner/care team to provide appropriate periodic reassessment
- Ready availability of pulse oximetry and respiratory disease management
- Experience, knowledge, and training of interprofessional staff

Preventing Acute Exacerbations. Exacerbations are major contributors to hospitalizations and the cost of care in COPD. Thus, measures to prevent or reduce exacerbations may reduce hospitalizations. The American College of Chest Physicians (CHEST) and the Canadian Thoracic Society (CTS) have developed recommendations for the prevention of acute exacerbations of COPD.[140] The recommendations addressed three key clinical questions by using the PICO (population, intervention, comparator, and outcome) format: nonpharmacologic therapies, inhaled therapies, and oral therapies. Although the guideline does not specifically address the PA/LTC setting, it is an evidence-based analysis that places high value on the avoidance of hospitalization. The executive summary of the guidelines developed by CHEST and CTS presents a useful decision tree for the prevention of acute exacerbations of COPD.

1 PALTmed. (2015). Ten Things Physicians and Patients Should Question. Choosing Wisely website. http://www. choosingwisely.org/societies/amda-the-society-for-post-acute-and-long-term-care-medicine/.

STEP 15

Manage comorbidities associated with COPD. Many patients with COPD also suffer from other chronic illnesses which can affect the severity of COPD and further limit their respiratory and cardiac functional reserves.[142]

Coronary artery disease and coexisting heart failure may exacerbate COPD and confuse the interpretation of signs and symptoms. COPD is associated with CHF in more than 20% of patients.[142] Right-ventricular heart failure may be caused by COPD or by pulmonary hypertension. Treatments for right-ventricular heart failure may include ACE inhibitors or angiotensin II receptor blockers, beta blockers, diuretics, and inotropic support. (See PALTmed's clinical practice guideline on heart failure[m] and the 2013 ACCF/AHA Guideline for the Management of Heart Failure[143]).

Increased glucose monitoring may be appropriate for patients who have coexisting diabetes because the use of systemic steroids elevates blood glucose and worsens impaired glucose tolerance. Other diseases (e.g., arthritis, dementia, stroke) may affect the patient's prognosis and functional abilities, including the ability to use an inhaler.

Anxiety and depression often coexist with COPD and should be evaluated and treated. (Also see PALTmed's clinical practice guideline on depression.[n]) When considering pharmacotherapy for anxiety or depression in a patient with COPD, choose an agent not associated with respiratory depression (e.g., buspirone, selective serotonin reuptake inhibitors). Depression and anxiety may partially improve if, in addition to standard treatment for these conditions, COPD is optimally managed.

Patients with severe COPD frequently have disturbed sleep and poor sleep quality. They have decreased sleep time, less rapid-eye-movement sleep, and increased fragmentation of sleep.[144] Poor sleep quality is probably a major factor in the chronic fatigue and impaired quality of life reported by patients with severe COPD. Sleep duration and quality are frequently overlooked in studies evaluating the effectiveness of therapy on quality of life in patients with COPD.[145] Surveys in patients with chronic bronchitis and emphysema revealed sleep difficulties as the third most common symptom behind dyspnea and fatigue, thus making assessment of sleep quality important.[144] See PALTmed's Clinical Practice Guideline on sleep disorders for additional information on managing sleep difficulty in the PA/LTC setting.[o]

Obstructive sleep apnea. Many COPD patients in PA/LTC will have obstructive sleep apnea (OSA).[9] OSA is defined by an intermittent collapse of the upper airway resulting in repetitive hypoxemia and arousal.[144] Obesity is a risk factor for OSA.[144] The diagnosis and treatment of OSA or sleep apnea-hypopnea syndrome (SAHS) requires evaluation with sophisticated equipment and specialized medical interpretation of complex sleep data, which are generally derived from an overnight sleep test. Sleep testing includes overnight oximetry trending during the various sleep cycles. Further information about the diagnosis[146] or management of OSA[147] is available from the American College of Physicians and the American Academy of Sleep Medicine.[148]

The combination of COPD and SAHS has been termed the ''overlap syndrome.''[149] Studies have shown patients with COPD and OSA, or overlap syndrome, are at greater risk for prolonged nocturnal

[m] PALTmed. eart Failure. Clinical Practice Guideline. Ordering information available at https://paltmed.org/products/copd-management-cpg.

[n] PALTmed. Depression. Clinical Practice Guideline. Ordering information available at https://paltmed.org/products/copd-management-cpg.

[o] PALTmed. Sleep Disorders. Clinical Practice Guideline. Ordering information available at https://paltmed.org/products/copd-management-cpg.

oxygen desaturation than are patients with OSA alone.[144,150] Patients with overlap syndrome are at risk of developing pulmonary hypertension even though their obstructive defect is not severe. In patients with overlap syndrome, hypoxemia, hypercapnia, and pulmonary hypertension can be observed in the presence of mild to moderate bronchial obstruction.[151]

Continuous positive airway pressure (CPAP) is the current accepted standard treatment.[9,144,150,151] The goal of treatment is to maintain oxygenation at all times and to prevent sleep-disordered breathing. Patients with overlap syndrome will most likely require nocturnal oxygen therapy and CPAP to support oxygenation and prevent episodes of apnea. Some patients may not tolerate face masks or even nasal interface applications of CPAP owing to dyspnea and discomfort. Some may feel claustrophobic. Patient adherence, acceptance, and comfort are important factors to take into consideration with COPD patients and particularly in patients with very severe disease. If CPAP treatment was prescribed for home or hospital admission prior to PA/LTC admission, continued use should be considered and reviewed by the treating physician.

STEP 16

Consider specialty referral. Referral to a pulmonologist or cardiologist may be appropriate in any of the following clinical situations:

- Acute event requiring hospitalization
- Airflow limitation despite only a short smoking history
- Frequent exacerbations of COPD
- Heart failure that is difficult to manage
- Practitioner uncertainty about the patient's diagnosis or management
- Progressive symptoms despite optimal medication
- Rapidly progressive pulmonary impairment despite usual care
- Severe dyspnea

Specialty referral may be inappropriate or unavailable for many patients with COPD in the PA/LTC setting. When determining whether to make a specialty referral, consider the patient's cognitive and functional status, expressed preferences, life expectancy, and severity of disease, as well as the availability of and access to subspecialty input, the capabilities and experience of the interprofessional care team, and the immediacy of the clinical need.

STEP 17

Determine when the patient's condition is end-stage. Before the patient with COPD develops advanced disease, he or she should be counseled about end-of-life planning and encouraged to draw up advance directives, if this has not already been done. This helps to ensure the patient's wishes and care preferences are known and respected and also relieves the family and other caregivers of what may be difficult decisions.[64] For additional guidance on end-of-life care, see PALTmed's LTC information series.[p]

[p] PALTmed. Palliative Care. LTC Information Toolkit. Ordering information available at https://paltmed.org/products/copd-management-cpg.

The practitioner should discuss with the patient and family whether emergency measures such as mechanical ventilation in an intensive care unit are appropriate or desirable. In at least one study, spouses and practitioners were wrong 40% of the time when asked about patients' preferences regarding ventilation and cardiopulmonary resuscitation.[64] According to another study, the likelihood in which patients with limited life expectancy will refuse treatment increases in direct proportion to the invasiveness of the treatment and the likelihood of a poor outcome.[152]

Subject to the patient's wishes, ensure that all likely causes of decline have been considered and all appropriate therapies exhausted before concluding the patient's condition is end-stage. Table 17 lists signs and symptoms of pulmonary disease suggests further active treatment may be medically ineffective. "Do Not Hospitalize (DNH)" orders may be considered and have been advocated for use in order to provide comfort care within the facility, although not all facilities allow these orders to be written. The practitioner may consider explaining death from end-stage COPD often results from coma secondary to carbon dioxide retention and should be peaceful and painless.[64]

If a patient who has a Do Not Resuscitate (DNR), sometimes referred to as Allow Natural Death, order is hospitalized, the facility must ensure the staff treating the patient in the hospital are aware of his or her wishes with regard to life-sustaining treatment. Many states now implement programs such as the Physician Orders for Life-Sustaining Treatment (POLST) Paradigm, which includes a signed form clarifying the patient's wishes concerning end-of-life interventions and accompanies the patient across care settings. (A list of states with POLST Paradigm programs is available at http://www.polst.org.) Additionally, ensure all staff caring for the patient have ready access to relevant care directives.

End-of-life care for the patient with end-stage COPD may include fluids, oxygen, and sedation, if appropriate. Administer fluids judiciously; at the end of life they may increase pulmonary congestion. Benzodiazepines and opioids may be given to relieve dyspnea at the end of life. Guidance on the palliative management of dyspnea crisis is available from the American Thoracic Society.[153] In end-of-life care, balance the potential adverse effects of these agents (respiratory depression and decreased mental alertness) against the symptomatic relief they offer the patient.[64] Consider and respect the patient's expressed wishes concerning the preference for symptom relief or alertness.

TABLE 17

Poor Prognostic Indicators for Patients with COPD Which Suggest the Need for Palliative or Hospice Care

- Disabling shortness of breath at rest
- Increased emergency room visits or hospitalizations
- Low oxygenation at rest (PaO2 less than 55 mm Hg or SaO2 less than 88%)
- Right heart failure secondary to pulmonary disease
- Unintentional progressive weight loss greater than 10% in last 6 months
- Resting heart rate greater than 100 beats/minute
- PaO2: arterial oxygen pressure; SaO2: arterial oxygen percent saturation.

MONITORING

Because COPD is a progressive disorder, patients must be reassessed regularly. At a minimum, reassessment of the patient's overall functioning should occur at each quarterly review and at any time a significant change is noted in the patient's condition.

The progressive nature of COPD also means preventing further decline in a patient's level of functioning may not always be a realistic therapeutic goal. Periodic reappraisal of the goals of therapy is an essential component of ongoing care. As noted above, the practitioner should address the status of the patient's COPD in his or her periodic notes, which should document the reasons for treatment choices consistent with the overall plan of care developed and revised by the interprofessional team.

STEP 18

Monitor the patient's symptoms and functional ability. Table 18 lists aspects of the patient's status that should be monitored at regular intervals.

TABLE 18

Aspects of the Patient's Status That Should Be Monitored Regularly

- Ability to speak in full sentences without breathlessness
- Ability to perform ADLs independently
- Change in sputum production or color
- Endurance
- Food intake and hydration status
- Mental status
- Pulse oximetry readings at rest and with exertion
- Severity of respiratory symptoms (e.g., cough, dyspnea, sputum production)
- Stability of vital signs
- Symptoms of anxiety or depression
- Weight (unintended weight loss is a poor prognostic sign)

Pulse oximetry should be used to assess all stable patients with FEV1 less than 35% predicted.[2] Screening pulse oximetry should also be considered for patients with evidence of right heart failure. As noted above, all patients with evidence of an acute exacerbation of COPD should undergo pulse oximetry. Note that the pulse oximeter should not be used to measure pulse; an actual pulse should be measured. The pulse on the meter is for quality control assessment of the level of oxygen saturation and does not eliminate the need for a separate nursing assessment of the patient's heart rate.

STEP 19

Monitor the use of medications to treat COPD. Monitor medications regularly to ensure drug interactions and adverse effects are addressed promptly. Review medications at any time a significant change is noted in the patient's clinical condition. Consider eliminating or reducing dosages of medications associated with adverse effects or which produce no demonstrable benefit. To the extent possible, use pharmacologic agents with the lowest adverse-effect profile. Document adverse medication effects and the steps taken to correct them in the patient's record.

STEP 20

Monitor the facility's management of COPD. Systematic monitoring is needed to determine the extent to which a long-term facility is successful in managing COPD. A facility may wish to select several of the indicators in Table 19 that are most relevant to its population and staff for inclusion in its quality improvement process. The medical director should be actively involved in this process.

TABLE 19
Sample Performance Measurement Indicators

Outcome Indicators

- Decreases in:
  - Acute exacerbations of COPD
  - Avoidable hospitalizations for patients with COPD
  - Rate of upper respiratory infections in patients with COPD
  - Smoking rate in the facility
  - Use of nebulizers in patients who can be given, or can self-administer, MDIs
- Increase in:
  - Participation by COPD patients in exercise programs
  - Use of appropriate medications

Process Indicators

- Evaluation of staff competencies
- Immunization policies for residents and staff (including visiting physicians)
- Increase in standing order for treatment of acute exacerbations
- Use of spacer devices when appropriate
- Pertinent drug regimen review by consultant pharmacist
- Presence of:
  - Education programs related to COPD
  - Smoking cessation programs
  - Tailored exercise programs for patients following acute exacerbations
- Restorative nursing and rehabilitation care tailored to the needs of COPD patients
- Use of protocols for managing acute exacerbations of COPD

SUMMARY

COPD is a treatable but progressive disease characterized by persistent airflow limitation and is not fully reversible. Although age is usually considered a risk factor for COPD owing to changes in lung function related to aging as well as the cumulative effect of lifetime exposures, healthy aging should not lead to COPD. In a PA/LTC facility, COPD is often a comorbidity rather than the primary reason for a patient's admission. In addition, because of their advanced age and smoking history, typical patients with COPD experience multimorbidity. Few physical symptoms clearly differentiate COPD from other respiratory conditions such as asthma and from other chronic diseases common in frail elderly people such as CHF. Thus, the recognition, assessment, treatment, and monitoring of COPD in the PA/LTC setting can be challenging.

Although COPD is by definition not fully reversible, effective interventions exist which may ameliorate symptoms and significantly improve patients' function and quality of life. Interventions exist which may reduce exacerbations of the disease and possibly reduce hospitalizations. The treatment of COPD should be individualized and be medically realistic, taking into account the patient's severity of disease, comorbidities, prognosis, life expectancy, and expressed preferences. This clinical practice guideline has outlined a comprehensive and evidence-based approach to the recognition, assessment, treatment, and monitoring of COPD in the PA/LTC setting.

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APPENDIX 1
Borg Scale of Perceived Exertion

How you might describe your exertion	Borg rating of your exertion	Examples (for most adults <65 years old)
None	6	Reading a book, watching television
Very, very light	7 to 8	Tying shoes
Very light	9 to 10	Chores like folding clothes that seem to take little effort
Fairly light	11 to 12	Walking through the grocery store or other activities that require some effort but not enough to speed up your breathing
Somewhat hard	13 to 14	Brisk walking or other activities that require moderate effort and speed your heart rate and breathing but don't make you out of breath
Hard	15 to 16	Bicycling, swimming, or other activities that take vigorous effort and get the heart pounding and make breathing very fast
Very hard	17 to 18	The highest level of activity you can sustain
Very, very hard	19 to 20	A finishing kick in a race or other burst of activity that you can't maintain for long

Sources:
Harvard T.H. Chan School of Public Health. The Borg Scale of Perceived Exertion. http://www.hsph.harvard.edu/nutritionsource/borg-scale/. Accessed June 29, 2015.

Borg 1982[26]

APPENDIX 2

A. Medications Absolutely Contraindicated in Chronic Obstructive Pulmonary Disease

Medication	Possible Adverse Drug Event	Comment
Hydromorphone	Respiratory depression	In patients with COPD as well as decreased respiratory reserve, hypoxia, hypercapnia, respiratory insufficiency, upper airway obstruction, or preexisting respiratory depression, it is recommended that non-opioid analgesics be considered as alternatives to hydromorphone, as even usual therapeutic doses may decrease respiratory drive and cause apnea in these patient populations.
Insulin, inhaled	Acute bronchospasm	Inhaled insulin is contraindicated in COPD because of the risk of acute bronchospasm.
Levobunolol ophthalmic solution	Acute bronchospasm	Levobunolol is contraindicated in patients with bronchial asthma, history of bronchial asthma, or severe COPD. Use levobunolol with caution in patients with other pulmonary disease (e.g., mild to moderate chronic obstructive pulmonary disease (COPD), emphysema, bronchitis) in which acute bronchospasm would put them at risk.
Loxapine for oral inhalation	Acute bronchospasm	Loxapine for oral inhalation (Adasuve) is contraindicated in patients with a current diagnosis or history of asthma, chronic obstructive pulmonary disease (COPD) (e.g., emphysema), or other pulmonary disease associated with bronchospasm. The drug is also contraindicated in patients with acute respiratory signs or symptoms (e.g., wheezing, acute bronchospasm, dyspnea) or those currently receiving medications for airway diseases such as asthma or COPD. Inhalational loxapine can cause bronchospasm, potentially leading to respiratory distress and respiratory arrest; therefore, it must be administered by a healthcare professional
Metipranolol ophthalmic solution	Acute bronchospasm	Metipranolol is a nonselective beta-antagonist, which may increase the risk of respiratory reactions in predisposed patients. Metipranolol is contraindicated in patients with bronchial asthma, history of bronchial asthma, or other pulmonary disease in which acute bronchospasm is a risk factor (e.g., severe chronic obstructive pulmonary disease (COPD), like emphysema or chronic bronchitis).
Timolol, Timolol Combinations	Bronchospasm	Non-selective beta blocking agents are contraindicated in pulmonary disease, but all beta-blockers should be used cautiously in these patients, especially with high dose therapy. Severe respiratory reactions due to bronchospasm in patients with asthma have been reported with oral and topically applied beta adrenergic blockers.

B. Medications Commonly Used in Chronic Care With Precautions for Chronic Pulmonary Disease

Alprazolam	Codeine	Medical marijuana	Pindolol
Amiodarone	Diphenhydramine	Meperidine	Promethazine
Atenolol	Donepezil	Methadone	Propranolol
Atropine	Fentanyl	Metoprolol	Rivastigmine
Betaxolol	Flurazepam	Morphine sulfate	Scopolamine
Bethanechol	Galantamine	Nadolol	Sotalol
Bisoprolol	Hydrocodone	Oseltamivir	Temazepam
Carvedilol	Hydroxyzine	Oxazepam	Topiramate
Chlorpheniramine	Itraconazole	Oxycodone Oxymorphone	Zaleplon
Cisapride	Labetalol	Pilocarpine	Zanamivir
Clonazepam	Lorazepam		Zolpidem

Source: Clinical Pharmacology [database]. 2015. Tampa, FL: Elsevier Gold Standard. https://www.clinicalpharmacology.com/ [access by subscription, registration].

APPENDIX 3

Evidence-Based Interventions for the Treatment of COPD Patients from the 2014 Academy of Nutrition and Dietetics Evidence Analysis Library

- Advise that the selection of medical food supplements for individuals with COPD be influenced more by patient preference than by the percentage of fat or carbohydrate. Limited evidence supports the consumption of a particular macronutrient composition of medical food supplementation.
- Recommend frequent small amounts of medical food supplements for individuals with COPD. Studies report that frequent small amounts of medical food supplements are preferred to avoid postprandial dyspnea and satiety and to improve compliance.
- For inpatients with COPD who have low BMI (under 20 kg/m2), unintentional weight loss, reduced oral intake, or who are at nutritional risk, initiate provision of medical food supplements. Studies report that medical food supplementation for 7 to 12 days results in increased energy intake in the inpatient setting.
- Encourage individuals with COPD to consume a diet that meets the Recommended Dietary Allowances (RDA) for vitamin A, vitamin C, and vitamin E. Several studies report reduced serum or tissue levels of vitamin A, vitamin C, and vitamin E in individuals with COPD; however adequately powered studies have not been conducted to evaluate the effects of intake above the RDA.
- Encourage individuals with COPD to consume a diet that meets the Adequate Intake (AI) for omega-3 fatty acids. Adequately powered studies have not been conducted to evaluate the effects of intake above the AI.
- Advise individuals with COPD that the consumption of milk and milk products is unrelated to mucus production. Studies report no significant effect of milk and milk product consumption on mucus production or various lung function parameters, despite individual sensory perception.

GLOSSARY

Acute exacerbation: an acute change in baseline dyspnea, cough, or sputum beyond day-to-day variability that is sufficient to warrant a change in therapy

Dynamic hyperinflation: a temporary and variable increase in the volume of air in the lungs when insufficient exhalation time or airflow limitation traps air in the lungs between breaths

Dyspnea: shortness of breath

Expiratory muscle training: a rehabilitative therapy that may improve nonventilatory functions such as swallowing

Hypercapnia: abnormally increased amount of carbon dioxide in the blood

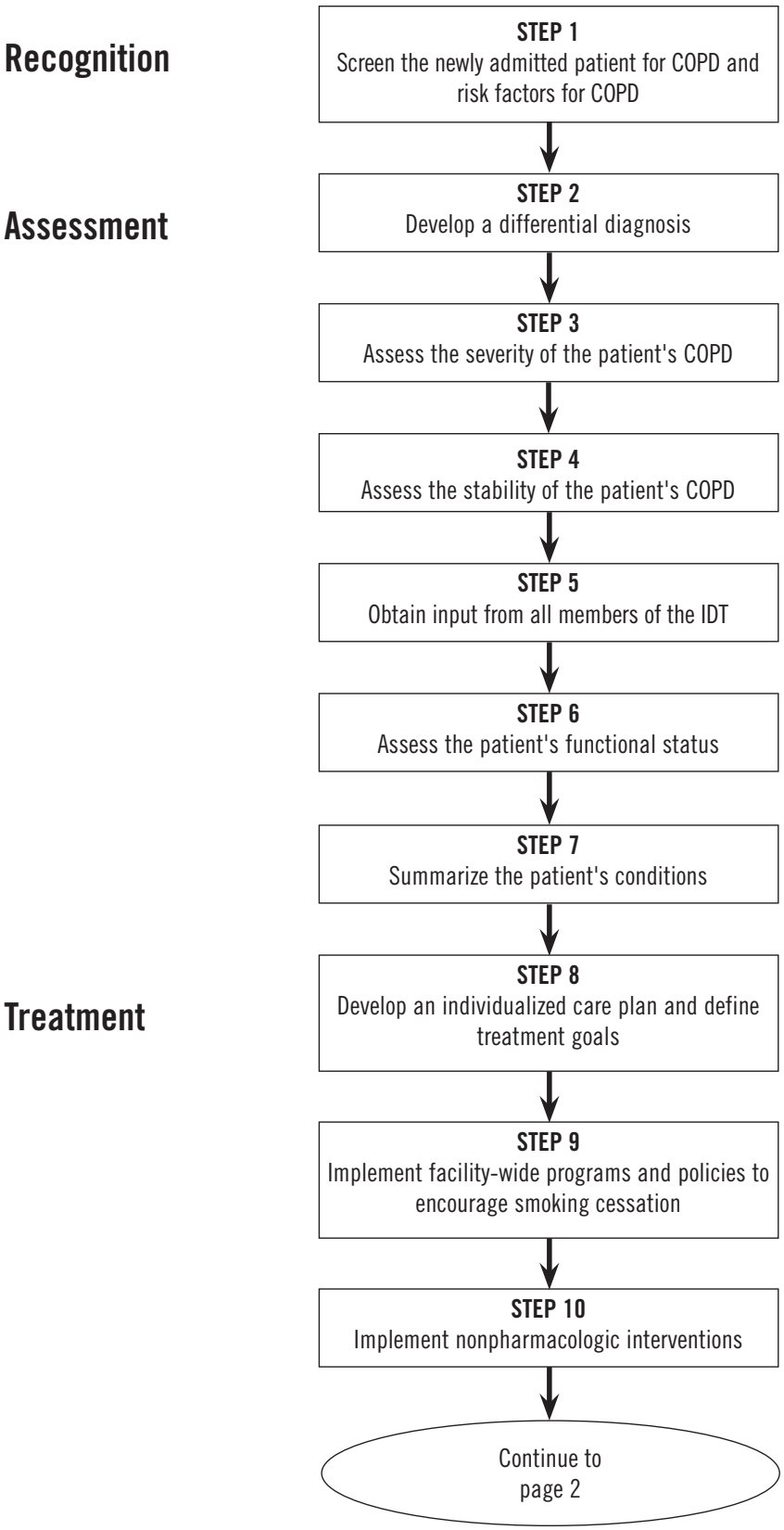
Hypoxemia: abnormally low amount of oxygen in the blood

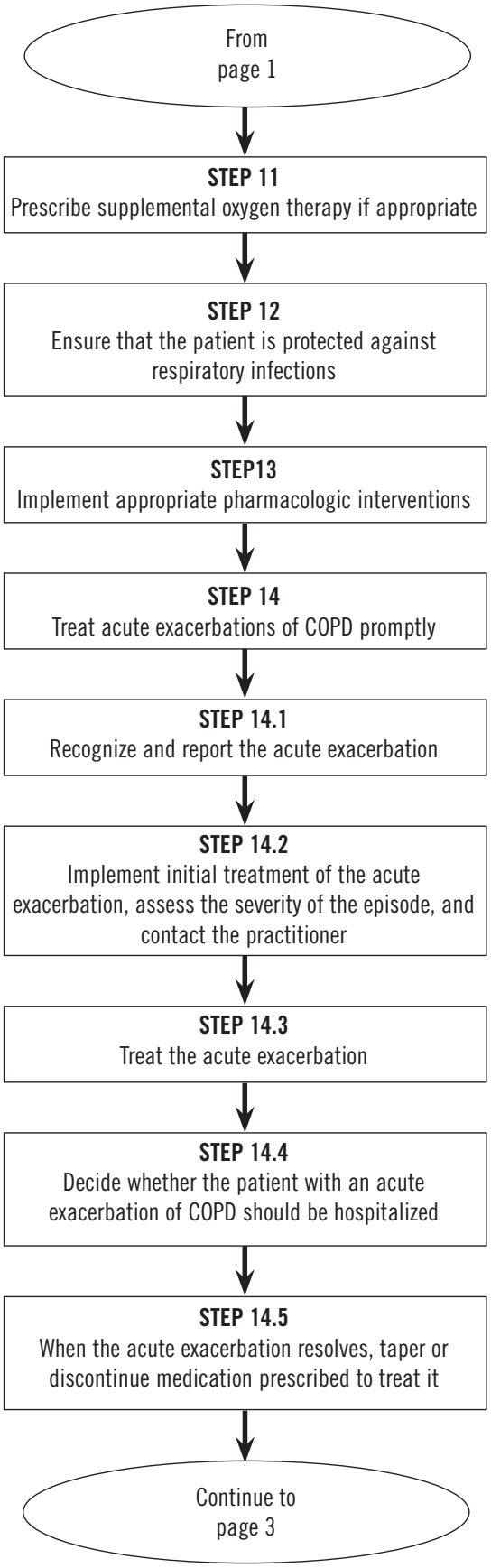
Inspiratory muscle training: a therapy consisting of a series of breathing exercises that can make it easier for people to breathe

Multimorbidity: the co-occurrence of two or more chronic medical or psychiatric conditions in the same patient

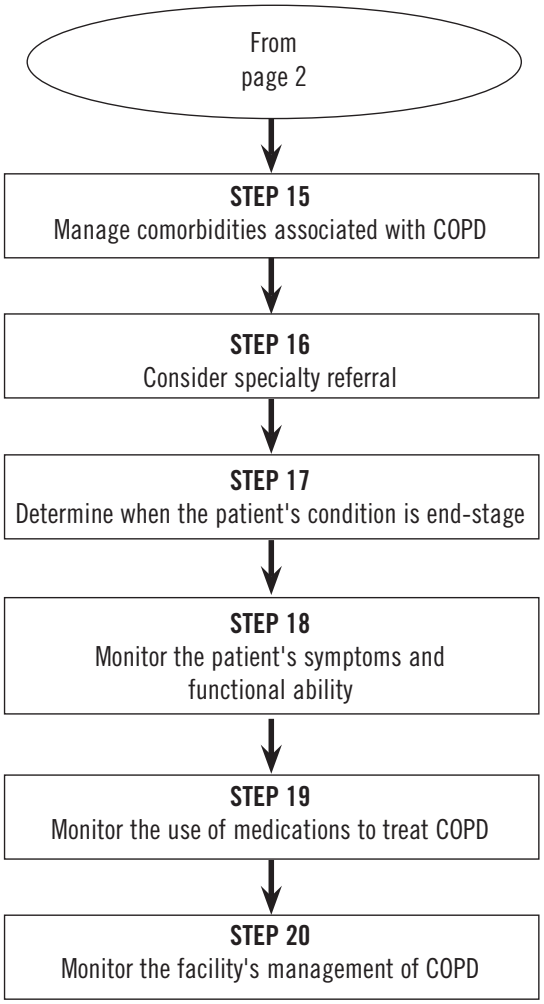
Ventilation/perfusion mismatch: when the exchange of air between the lungs and the environment (ventilation, V) is not evenly matched with the amount of blood passing through the lungs (perfusion, Q). Ventilation/perfusion mismatch is the most common cause of hypoxemia.

This is the COPD management in the post-acute and long-term care setting algorithm to be used in conjunction with the written text of this clinical practice guideline. The numbers next to the different components of the algorithm correspond with the steps in the text.


Recognition
STEP 1
Screen the newly admitted patient for COPD and risk factors for COPD
Assessment
STEP 2
Develop a differential diagnosis
STEP 3
Assess the severity of the patient's COPD
STEP 4
Assess the stability of the patient's COPD
STEP 5
Obtain input from all members of the IDT
STEP 6
Assess the patient's functional status
STEP 7
Summarize the patient's conditions
Treatment
STEP 8
Develop an individualized care plan and define treatment goals
STEP 9
Implement facility-wide programs and policies to encourage smoking cessation
STEP 10
Implement nonpharmacologic interventions
Continue to page 2


From page 1
STEP 11
Prescribe supplemental oxygen therapy if appropriate
STEP 12
Ensure that the patient is protected against respiratory infections
STEP13
Implement appropriate pharmacologic interventions
STEP 14
Treat acute exacerbations of COPD promptly
STEP 14.1
Recognize and report the acute exacerbation
STEP 14.2
Implement initial treatment of the acute exacerbation, assess the severity of the episode, and contact the practitioner
STEP 14.3
Treat the acute exacerbation
STEP 14.4
Decide whether the patient with an acute exacerbation of COPD should be hospitalized
STEP 14.5
When the acute exacerbation resolves, taper or discontinue medication prescribed to treat it
Continue to page 3

Monitoring


From page 2
STEP 15
Manage comorbidities associated with COPD
STEP 16
Consider specialty referral
STEP 17
Determine when the patient's condition is end-stage
STEP 18
Monitor the patient's symptoms and functional ability
STEP 19
Monitor the use of medications to treat COPD
STEP 20
Monitor the facility's management of COPD

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