MTM essentials for COPD management: Part 2

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Abstract

Chronic obstructive pulmonary disease (COPD) is a diagnosis that pharmacists commonly encounter among patients in pharmacy practice. Treatment of COPD requires chronic management, which can be expensive for patients. Exacerbations of COPD are also very costly for healthcare systems. Pharmacists can assist patients with improving self-care of COPD in an effort to improve patient outcomes associated with appropriate management and adherence to medications. Through these efforts, pharmacists can also help to reduce hospital readmission rates and prevent the costly payment penalties implemented by the Centers for Medicare and Medicaid Services associated with excessive COPD readmissions. This article discusses some of the opportunities pharmacists have to address these concerns.
Background
Chronic obstructive pulmonary disease (COPD) is the third leading cause of death in the United States. A progressive disease, COPD is associated with a high rate of hospital admissions and readmissions for exacerbations of the disease. In October 2014, pursuant to the Hospital Readmission Reduction Program as mandated by the Affordable Care Act, the Centers for Medicare and Medicaid Services (CMS) began reducing payments to hospitals with excessive readmissions for COPD. Hospitals primarily address exacerbation treatment, an acute care need, of patients with COPD. The patient is primarily responsible for his or her chronic disease management on a day-to-day basis to maintain control of the disease in the outpatient setting. However, patients with COPD utilize healthcare resources at a high rate. This indicates a need for improved chronic disease management. In an effort to promote wellness of patients and avoid penalties associated with excessive readmissions for COPD, healthcare systems are developing strategies to better assist patients with their disease management and therefore alleviate payment penalties. Pharmacists are well positioned to positively affect patient outcomes and readmission rates by assisting patients with chronic disease management.

How can pharmacists help?
Appropriate management of COPD can alleviate symptoms and reduce the number of exacerbations and hospitalizations that a patient experiences. Specifically, improvements in the patient’s ability to self-manage COPD can improve exacerbation and hospitalization rates. Pharmacists can use their knowledge and skills to help close gaps in care related to a patient’s COPD management by addressing risk factors and promoting prescriber adherence to guidelines and patient adherence to therapy.

Prevent exacerbations, hospitalizations, and readmissions
To prevent exacerbations, hospitalizations, and readmissions, clinicians and patients must work to prevent or manage risk factors associated with these events. An exacerbation is defined as “an acute event characterized by a worsening of the patient’s day-to-day variations” and leading to a change in medication.5 Exacerbations significantly affect a patient’s rate of declining health status and mortality. A patient may require weeks to recover from an exacerbation, during which time respiratory symptoms are more severe. Exacerbations can be precipitated by respiratory tract infections, air quality pollutants, and interruptions in maintenance therapy for COPD management. Reducing exacerbations is a key strategy of COPD management. However, insufficient research has been conducted to identify and measure the effect of risk factors associated with exacerbations on patient outcomes. Identified risk factors include a reduction in forced expiratory volume in one second (FEV1) predicted, older age, low body mass index, chronic bronchitis, gastroesophageal reflux disease, poor quality of life, anxiety, and depression. A previous history of exacerbation is the strongest predictor for future exacerbation. Patients identified as having two or more exacerbations within one year have been characterized as having a frequent exacerbation phenotype and are at high risk of a future exacerbation independent of the stage of their disease. Further research is needed to allow clinicians to stratify risks according to predictive value and identify modifications to therapy for improved patients outcomes. Until such time, the Global Initiative for Chronic Obstructive Lung Disease (GOLD) guidelines identify four strategies for preventing COPD exacerbations: encouraging smoking cessation and influenza and pneumococcal immunization for all patients with COPD; using long-acting bronchodilators in patients classified as patient groups B, C, and D; ensuring clear patient knowledge of medication therapy and proper inhaler technique; and possibly administering phosphodiesterase-4 inhibitors in patients with all of the following, FEV1 less than 50% of predicted value (GOLD 3 and GOLD 4 classifications for airflow...
MTM ESSENTIALS FOR COPD MANAGEMENT: PART 2

**TABLE 1**

<table>
<thead>
<tr>
<th>STEPS OF THE TEACH-BACK METHOD</th>
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<tbody>
<tr>
<td>1. Using simple language, clearly explain the concept/demonstrate the process.</td>
</tr>
<tr>
<td>2. Ask the patient to use his or her own words to state how he or she understands the concept/demonstrate the process.</td>
</tr>
<tr>
<td>3. Identify and correct misunderstandings and improper techniques or re-explain the concept/demonstrate the process again.</td>
</tr>
<tr>
<td>4. Ask the patient to re-explain/demonstrate again to ensure proper understanding of concepts/techniques.</td>
</tr>
<tr>
<td>5. Repeat steps 3 and 4 until you are satisfied that the patient comprehends or can safely perform the process you demonstrated.</td>
</tr>
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Source: Ref 35

Continuing Education

Pharmacists can play strong roles in each program, ensuring that these recommended strategies by group are carefully constructed hospital discharge processes that include postdischarge follow-up with patients and are aimed at lowering hospital readmission rates.33,34 The RED program demonstrated a lower rate of hospital utilization rates (emergency room visits, hospitalizations and readmissions) among patients prescribed medications (emergency room services and readmissions) among patients receiving the intervention.33 and the BOOST program demonstrated a reduction in 30-day readmission rates.34 The “teach-back” method was specifically used to clarify patient understanding regarding how to take prescribed medications (Table 1).35 Pharmacists had strong roles in each program, demonstrating that pharmacists can play a role in readmission reduction strategies.

CMS contracted with a company to study the effects of medication therapy management (MTM) services on beneficiaries with chronic disease states including COPD. Patients with COPD who were engaged in MTM services received improved quality drug therapies and experienced improved adherence to long-acting bronchodilators (LABA only and LABA + LAMA combination).36 However, at one year, outcomes related to healthcare utilization rates and costs were inconsistent when compared to Medicare beneficiaries who did not receive MTM services.36 This study, which included patients with other chronic diseases, demonstrated variation in the practice of MTM across organizations. The study allowed for identification of those with high-performing comprehensive medication review programs, which demonstrated consistent improvements in drug therapy outcomes as well as healthcare utilization rates and cost. The final report included a list of strategies for improving the success of MTM services. Recommendations included the development of clear MTM eligibility criteria, improvement of patient and provider awareness of MTM services and its benefits, the need to optimize engagement in comprehensive medication review, development of best practice standards for comprehensive medication review, utilization of technology and information systems, integration of MTM with healthcare systems, development of quality measures for assessment of MTM services, and development of incentivizing payment strategies for medication management.39 It has been further suggested that patients with identified adherence issues should be specifically targeted for MTM services that can assist patients with these concerns. Current eligibility criteria for MTM services target beneficiaries with high drug costs and multiple disease states. Patients who do not adhere to medications may not be adequately identified and targeted for the service that may assist them with improving adherence.37

Promote the guidelines

The GOLD guidelines are established clinical practice recommendations for the diagnosis, management, and prevention of COPD. Most patients with COPD are diagnosed and treated by their primary care provider. In a survey involving a national sample of physicians, only 54% of primary care physicians were aware of the GOLD guidelines for COPD.38 One study comparing the implementation of asthma and COPD guidelines in patient care discovered the undertreatment of patients with COPD, particularly in the early stages of the disease.39 The GOLD guidelines recommend that any patient experiencing severity, chronic bronchitis, and frequent exacerbations.2 A previous article in this series, MTM essentials for COPD management – Part 1, discusses identification of patient groups and appropriate medication strategies by group.

Pharmacists can fulfill a key role in ensuring that these recommended strategies are implemented by ensuring proper maintenance management of COPD as supported by clinical guidelines; providing immunizations and appropriate treatment of comorbid conditions; and offering patient education about COPD, medications, inhaler technique, and smoking cessation.

A systematic review of the literature assessed the factors associated with hospitalization and readmission of patients experiencing a COPD exacerbation.29 Previous hospitalizations, shortness of breath, and use of oral corticosteroids were predictive factors for readmission. Poor health status or health-related quality of life, chronic oxygen therapy, and lack of routine exercise were all correlated with increased risks of hospitalization and readmission. Although these factors may help to identify patients at risk of hospitalization and readmission, no data are available regarding how to modify care in an effort to reduce hospitalizations and readmissions in these patients. More research is necessary. With the reduction in payment by CMS for COPD readmissions, an increase in research to address risk factors and process of care issues related specifically to the care of patients with COPD is likely. However, the study of interventions aimed at reducing readmissions is not a new concept. Studies have demonstrated the effectiveness of patient counseling and follow-up aimed at improving the discharge process and transition of patient care from hospital to home in order to reduce adverse events leading to readmission.30,32 Although these studies were not specific to the population of patients with COPD, the interventions can easily be applied to this population.

Pharmacists can provide the necessary education regarding proper use and monitoring for efficacy and toxicity of a patient’s medication therapy, seek clarification of any changes to home medications after discharge, and periodically follow up with the patient to provide support and assess for and address concerns. The Better Outcomes for Older Adults through Safe Transitions (BOOST) program and the ReEng ineered Discharge process (RED) program are carefully constructed hospital discharge processes that include postdischarge follow-up with patients and are aimed at lowering hospital readmission rates.33,34 The RED program demonstrated a lower rate of hospital utilization rates (emergency room visits, hospitalizations and readmissions) among patients receiving the intervention,33 and the BOOST program demonstrated a reduction in 30-day readmission rates.34 The “teach-back” method was specifically used to clarify patient understanding regarding how to take prescribed medications (Table 1).35 Pharmacists had strong roles in each program, demonstrating that pharmacists can play a role in readmission reduction strategies.

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dyspnea, chronic cough or sputum production, and a history of exposure to smoke or other noxious chemicals or particulates or a strong family history of COPD should be evaluated for COPD. Pharmacists can recognize these symptoms and risk factors in a patient’s history and advocate for proper evaluation.

**Patients are more likely to stick with a therapy that they feel is working.**

Spirometry is required for a diagnosis of COPD. A patient with a postbronchodilator spirometric result of FEV1/forced vital capacity (FVC) lower than 0.7 receives a diagnosis of COPD. However, a study of spirometry use in 197,878 patients with COPD aged more than 40 years found that only one-third of patients diagnosed with COPD had undergone spirometry, and less than 20% of newly diagnosed patients had a spirometry test performed within 90 days of an exacerbation. Spirometry is a standardized and objective measure of airflow limitation. Its utility in diagnosing, staging, and guiding treatment strategies for COPD is the basis for multiple guidelines recommending its use for the confirmation of COPD when a diagnosis is clinically suspected. Pharmacists can collaborate with other healthcare providers and advocate for spirometry testing in patients with suspected COPD. Early identification of COPD allows for implementation of earlier interventions, which may alleviate a patient’s burden of symptoms and slow the progression of the disease.

Advocate for nonpharmacologic management strategies

The GOLD guidelines recommend nonpharmacologic management strategies for all patients with COPD. Physical activity is recommended for all patients with COPD. Smoking cessation is also listed as an essential management strategy for all patients with COPD; this intervention may include pharmacologic treatment for the management of nicotine withdrawal.

Pulmonary rehabilitation is recommended for patients falling into patient groups B through D. Pulmonary rehabilitation is a structured program consisting of exercise training, patient education, and emotional support intended to improve wellness by alleviating symptoms and increasing a patient’s participation in life activities. An effective pulmonary rehabilitation program extends a minimum of six weeks. The effectiveness of the program increases with its duration. This program has been shown to improve exercise tolerance and decrease shortness of breath and fatigue among patients with COPD. Pulmonary rehabilitation assists patients with many of the nonpulmonary concerns associated with COPD that may not be fully addressed by usual therapy, including physical deconditioning, muscle wasting, nutrition, social isolation, depression, and weight loss. Patients are provided education and strategies for coping with these issues (eg, exercise training) if a patient continues the training received in the rehabilitation program after the program’s end, studies suggest the benefits can be sustained after completion of a single pulmonary rehabilitation program. Barriers to patient adherence to a pulmonary rehabilitation program have been identified, such as a patient’s lack of confidence, lack of perception of change, lack of motivation towards participation in a rehabilitation program, and lack of access to a pulmonary rehabilitation program. This knowledge has provided healthcare providers with key ways for improving patient adherence to a pulmonary rehabilitation program: building a patient’s confidence, promoting tangible results, and helping patients prepare to engage in the program and gain access to available programs. Pharmacists can support patients in these ways by helping them to understand that COPD is a manageable disease. Patients often feel vulnerable and overwhelmed after receiving a diagnosis. Understanding how to manage their disease state as well as their feelings regarding their diagnosis can build patient confidence and possibly improve adherence to a pulmonary rehabilitation program. Patients are more likely to stick with a therapy that they feel is working. Appreciable improvements in breathing and exercise tolerance can increase a patient’s motivation for participating in a pulmonary rehabilitation program and increase his or her willingness to stick with the program. Explaining the importance and expectations of a pulmonary rehabilitation program can help a patient to prepare mentally and emotionally for engagement in the experience. For patients to participate in pulmonary rehabilitation programs, they must first have access to one. For some patients, this can be as simple as assisting in arranging for transportation services.

Immunize patients

Yearly influenza vaccination is recommended for all patients with COPD because it has been shown to reduce the incidence of serious respiratory tract infections, hospitalizations, and mortality in patients with COPD. The vaccination rate for patients aged 54 to 60 years was 45.3% during the 2013-2014 influenza season; 65% of Americans aged 65 years and older received influenza vaccinations during that season. The GOLD guidelines and the United States Advisory Committee on Immunization Practices (ACIP) recommendations also endorse vaccination of patients with COPD with pneumococcal polysaccharide conjugate vaccines.

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**Pause & Ponder**

How can you improve collaboration with other healthcare professionals in an effort to improve patient care?
ride vaccine. Current smokers should also receive pneumococcal vaccination. Vaccination with 23-valent pneumococcal polysaccharide vaccine (PPSV23) is recommended for both current smokers and patients with COPD. A study evaluating the effect of pneumococcal vaccination on rates of hospitalizations due to pneumonia in patients with COPD confirmed a reduction in pneumonia-related hospitalizations among patients who received pneumococcal vaccination. However, this study also demonstrated that rates of pneumococcal immunization are a cause for concern: only one in six veterans with COPD received pneumococcal immunization. Because pharmacists are highly accessible to patients and can provide immunizations after proper training, pharmacists can close this gap in care by verifying appropriate immunization status of all patients with COPD and by providing the needed immunizations to patients.

Help patients quit smoking
A model of smoking statistics and disease prevalence has demonstrated that today’s smoking rates determine tomorrow’s COPD burden. In 2013, 42.1 million Americans were smokers, of whom 76% were daily smokers. Healthcare spending attributed to smoking amounts to 170 billion dollars annually. Smoking cessation is the single most important intervention for altering the progression of COPD. Despite this, 39% of patients with COPD continue to smoke. Pharmacists are routinely interacting with patients who require chronic medication management. This routine interaction allows pharmacists to assess patients’ willingness to quit smoking and offer patients the support, counseling, and resources required for sustaining smoking cessation. The “Five A’s” strategy (ask, advise, assess, assist, and arrange) is a simple and effective process that pharmacists can use to help patients quit smoking (Table 3).

Address barriers to adherence
In 2000, the cost associated with medication nonadherence in the United States is estimated over 177 billion dollars. Hospital admissions related to medication nonadherence contributed 121.5 billion dollars to this total. Nonadherence to medications contributes to 33%-69% of all medication-related hospital admissions. Nonspecific to COPD patients, adherence to medications has been found to result in lowered healthcare utilization costs despite the increase in drug expenditure. Adherence to treatment for COPD improves survival and health outcomes and reduces healthcare utilization. Nonadherence is high in patients with COPD; among these patients, nonadherence to inhalers and oral medications is estimated to range from 41% to 57%. An opportunity exists for pharmacists to address the reasons for nonadherence in an effort to improve patient outcomes and costs.

More than 50% of patients use medications more than prescribed during respiratory distress, and up to 49% of patients underuse nebulized treatments. Underuse is the most common type of nonadherence. Half of patients prescribed inhaler therapies stop using these medications within the first year. Additionally, self-reported adherence rates are often higher than adherence rates calculated through objective measures. In a study that required patients to self-report adherence to bronchodilator therapy at years one and five, the patient-reported adherence rate at year one was 60%. By year five, the reported rate of adherence had dropped to less than 50%. During the study, patient adherence was also monitored by weighing the inhaler canister. Rates of adherence, as measured by canister weights, were at least 10% lower than the self-reported adherence rates. Canister weighing is an objective method for assessing patient adherence to therapy, but this method can overestimate adherence as patients may waste extra doses from the inhaler when they are aware that they are being monitored. Weighing canisters is no longer considered an accurate method for assessing doses remaining or patient adherence and is therefore not used in current clinical practice. Other objective means for assessing patient adherence include pill counts and medication refill history. Each of these methods may likewise overestimate adherence in patients who know they are being monitored for proper use or are prompted to refill their medications by automatic refill programs.

Today’s smoking rates determine tomorrow’s COPD burden.
A patient’s medication refill history is another potential tool for assessing medication adherence. However, a refill history is only available if patients purchase their medications. The cost of medications is a barrier to adherence for many patients. For example, over a span of two years, two million patients with Medicare coverage did not adhere to their prescribed treatments.

<table>
<thead>
<tr>
<th>TABLE 3</th>
<th>THE “FIVE A’S” MODEL FOR TREATING TOBACCO USE AND DEPENDENCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ask about tobacco use.</td>
<td>Identify and document tobacco use status for every patient at every visit.</td>
</tr>
<tr>
<td>Advise the patient to quit.</td>
<td>In a clear, strong, and personalized manner, urge every tobacco user to quit.</td>
</tr>
<tr>
<td>Assess the patient’s willingness to make a quit attempt.</td>
<td>Is the tobacco user willing to make a quit attempt at this time?</td>
</tr>
<tr>
<td>Assist in the patient’s quit attempt.</td>
<td>For the patient willing to make a quit attempt, offer medication and provide or refer for counseling or additional treatment to help the patient quit. For patients unwilling to quit at this time, provide interventions designed to increase the likelihood of future quit attempts.</td>
</tr>
<tr>
<td>Arrange follow-up.</td>
<td>For the patient willing to make a quit attempt, arrange for follow-up contacts, beginning within the first week after the quit date. For patients unwilling to make a quit attempt at this time, address tobacco dependence and willingness to quit at next clinic visit.</td>
</tr>
</tbody>
</table>

Source: Adapted from Ref 68
because of the cost of the medications. Using open-ended questions to directly ask patients about their ability to afford medications may provide useful information about nonadherence because of cost. For instance, asking “How do you pay for your medication?” and asking follow-up questions to address concerns about the cost of medications can prove helpful. Pharmacists can also review a patient’s complete medication list and determine the out-of-pocket cost to obtain a better understanding of the patient’s cost concerns and ability to pay. With this in mind, pharmacists may recommend lower-cost therapies or combination inhalers when possible to improve adherence. However, many medications for COPD are still branded, leaving no lower cost generic option available. Combination inhalers may reduce the number of copays for a patient, but depending on the patient’s insurance coverage, this single copay may be more expensive. Therefore, when recommending changes to a patient’s medications with the intent of lowering out-of-pocket cost to the patient, it is important to be familiar with that patient’s prescription drug coverage.

This technique of asking direct and open-ended questions in a nonjudgmental manner can also improve patient self-reporting. Patients feel more encouraged to discuss their experiences and concerns in this type of environment. Asking “Will you tell me how you take your medications?” or asking for a demonstration of how patients take their medications has been shown to be effective in soliciting greater information than closed-ended questions that are perceived as judgmental by patients.

There is a paucity of research specifically addressing medication adherence in patients with COPD. Despite this, some factors correlating with nonadherence to COPD therapies have been identified. Independent predictors of nonadherence include low expectation of medication effectiveness, presence of comorbidities, depression, and lack of confidence in the healthcare provider. Factors that correlate with decreased adherence include smoking, sporadic attendance at clinic appointments, older age, and expensive medication regimens. Interventions to improve adherence must be based on an assessment of an individual’s barriers to adherence to their medications.

**Role of the MTM pharmacist**

The interventions described in this article fit well into the framework for pharmacist-provided MTM. The MTM framework facilitates the collaboration of the healthcare team in an effort to achieve optimal patient outcomes through safe and effective use of medications. Patients with COPD could benefit from this service, which is designed to address gaps in care, coordination of care, education needs, comprehensive medication reviews, adherence issues, cost concerns, medication action plans, and consistent follow-up and support. Table 4 summarizes opportunities for pharmacists to address needs in patient care and potentially improve outcomes associated with COPD. The next article in this series will discuss assisting patients with proper inhaler technique for the variety of inhalers available today. For example, the techniques necessary for the proper use of metered dose inhalers and dry powder inhalers are different. A patient must understand the specific requirements for appropriate use of prescribed inhalers for the treatment of his or her COPD to ensure each dose of medication is properly delivered to the lungs.

**Conclusion**

Pharmacists are well positioned to address current gaps in care and assist patients in improving adherence to prescribed therapies and self-management of COPD, which may improve readmission rates and healthcare costs associated with COPD.

The references are available online at www.drugtopics.com/cpe.

**Pause & Ponder**

How would you assess a patient’s adherence to inhaler medications? What would you do to improve a patient’s adherence to his or her medications?
**TEST QUESTIONS**

1. Which of the following is a key nonpharmacologic strategy for the management of COPD and is supported in the GOLD guidelines as a nonpharmacologic therapy?
   - a. Assessment of inhaler technique
   - b. Pulmonary rehabilitation
   - c. Medication counseling
   - d. Medication therapy management services

2. All of the following strategies have demonstrated a reduction in healthcare utilization EXCEPT:
   - a. The BOOST program
   - b. The RED process
   - c. Pulmonary rehabilitation program
   - d. Weighing inhaler canisters to assess patient adherence

3. What is the most common type of nonadherence among patients with COPD?
   - a. Overuse of rescue medication
   - b. Underuse of inhaler therapies
   - c. Improper nebulizer technique
   - d. Sporadic attendance at clinic appointments

4. Which of the following is an independent predictor of nonadherence?
   - a. Depression
   - b. Smoking
   - c. Male sex
   - d. Two or more missed clinic appointments

5. Which of the following directly correlates with the future healthcare burden of COPD?
   - a. Nonadherence to clinical guidelines for disease management
   - b. Interprofessional collaboration in health care
   - c. Nonadherence to medications
   - d. Current smoking trend

6. All of the following therapies are general recommendations for all patients with COPD EXCEPT:
   - a. Influenza vaccination
   - b. Physical exercise
   - c. Smoking cessation
   - d. Pulmonary rehabilitation

7. Which of the following is the most important intervention that can alter the progression of COPD?
   - a. Smoking cessation
   - b. Proper inhaler technique
   - c. Initiating treatment with a phosphodiesterase-4 inhibitor
   - d. Immunization with influenza and pneumococcal vaccines

8. The GOLD guidelines recommend which of the following as a possible strategy to reduce exacerbations in patients with COPD?
   - a. Use of long-acting bronchodilators as the first-line therapy in all patients with COPD
   - b. Use of medication refill histories to assess for adherence issues
   - c. Addressing risk factors for hospital readmission with patients
   - d. Initiation of treatment with a phosphodiesterase-4 inhibitor in selected patients

9. Which of the following is the best predictor of a future exacerbation in a patient with COPD?
   - a. Gastroesophageal reflux disease
   - b. A previous exacerbation
   - c. Younger age
   - d. Anxiety

10. Which of the following has been identified as a predictive factor of patient readmission for COPD?
    - a. Use of oral corticosteroids
    - b. Established exercise routine
    - c. Overuse of rescue medications
    - d. Lack of a collaborative multidisciplinary discharge process

11. Which of the following is a strategy designed to help healthcare professionals assist patients with smoking cessation?
    - a. Teach-back method
    - b. The Five A’s method
    - c. The BOOST program
    - d. The RED process

12. All of the following can precipitate an exacerbation EXCEPT:
    - a. Interruption of maintenance therapy for COPD management
    - b. Respiratory tract infections
    - c. Exposure to pollution (poor air quality)
    - d. An increase in FEV₁

13. Which of the following factors correlates with increased risks of hospitalization and readmission?
    - a. Lack of routine exercise
    - b. Increased use of rescue inhaler
    - c. Use of spirometry for diagnosis
    - d. Lack of a collaborative multidisciplinary discharge process

14. Patients described as having a “frequent exacerbation phenotype”:
    - a. Are poorly adherent to medications
    - b. Do not attend pulmonary rehabilitation
    - c. Are at high risk of exacerbation independent of COPD stage
    - d. Cannot describe their prescribed chronic management of COPD

15. According to the GOLD guidelines, for which of the following patients is a spirometry test recommended?
    - a. A 27-year-old patient recently diagnosed with a respiratory infection who is experiencing new-onset cough and sputum production
    - b. A 56-year-old patient experiencing chronic cough and with a history of heavy smoking
    - c. A 47-year-old patient experiencing shortness of breath and recent exposure to poor air quality due to a high pollen count
    - d. A 52-year-old patient experiencing a cough and who recently began therapy with lisinopril

16. Which of the following patients would you most suspect may have barriers to adherence?
    - a. A patient who routinely refills his prescription two days before he runs out of medication
    - b. A patient who calls you for help to refill her prescription early because her purse was stolen with her medication inside
    - c. A patient who brings his prescription to you and confides that he has little confidence the medication will be able to help him
    - d. A patient who periodically misses a clinic appointment because of scheduling conflicts with work

17. The minimum duration of an effective pulmonary rehabilitation program is:
    - a. Four weeks
    - b. Six weeks
    - c. 12 weeks
    - d. 24 weeks

18. A reduction in FEV₁ % predicted is a risk factor for which of the following?
    - a. Readmission
    - b. Hospitalization
    - c. Exacerbation
    - d. Chronic cough

19. Which of the following is true regarding smoking?
    - a. Smoking correlates with decreased medication adherence rates.
    - b. Quitting smoking does not prevent exacerbations of COPD.
    - c. Current smoking rates do not correlate with expected future prevalence of COPD.
    - d. There is no benefit to quitting smoking once a patient has received a diagnosis of COPD.

20. Which of the following interventions has been shown to be effective at reducing readmission rates?
    - a. Reviewing a patient’s refill history
    - b. Chronic oxygen therapy
    - c. The BOOST program
    - d. Oral corticosteroids
References


36. Green RH, Singh SJ, Williams J, Morgan MD. A randomised controlled trial of four weeks versus seven weeks of pulmonary rehabilitation in chronic obstruc-
References


