A Review of the 2007 Guidelines for the Management of Patients with Unstable Angina/Non ST-Elevation Myocardial Infarction

Introduction
In August 2007, the American College of Cardiology (ACC) and American Heart Association (AHA) released updated guidelines on the management of patients with unstable angina/non ST-elevation myocardial infarction (UA/NSTEMI). The guidelines were last published in 2002 and the new recommendations incorporate results from major clinical trials published in the last 5 years. Specifically, the 2007 guidelines place a greater emphasis on earlier access to medical care and evaluation of troponin as the dominant cardiac biomarker of necrosis. Additionally, the 2007 update discusses the use of 2 newer anticoagulants (fondaparinux and bivalirudin) as alternatives to unfractionated heparin and low-molecular-weight heparin. New data with clopidogrel advocating longer administration times are also presented. Key highlights from the 2007 guidelines are summarized below. Clinicians are encouraged to review the full 2007 update at www.acc.org.

Clinical Assessment/Early Risk Stratification
Patients with symptoms of UA/NSTEMI such as chest pain, shortness of breath, weakness, diaphoresis, nausea, and/or lightheadedness should be instructed to contact 911 immediately and transported to the hospital via ambulance rather than by friends or relatives. Additionally, patients with suspected UA/NSTEMI for whom nitroglycerin (NTG) has previously been prescribed should be instructed to take 1 dose of NTG for chest discomfort/pain and if symptoms do not improve or worsen, they should be instructed to call 911 immediately before taking additional doses of NTG. If symptoms significantly improve after 1 dose of NTG, patients can be instructed to repeat NTG every 5 minutes for a maximum of 3 doses and call 911 if symptoms have not resolved completely. Emergency providers should administer 162 to 325 mg of aspirin (ASA) unless contraindicated or already taken by the patient. Non-enteric formulations of ASA should be administered for more rapid absorption.

An evaluation of medical history, physical examination, electrocardiogram (ECG), renal function, and cardiac biomarkers should be performed to assess a patient’s short-term risk of death or nonfatal cardiac MI. A 12-lead ECG should be performed within 10 minutes of arriving to the emergency room and repeated every 15 to 30 minutes for patients who remain symptomatic. Cardiac biomarkers should be assessed in all patients who present with chest discomfort within 6 hours of the onset of symptoms and repeated 8 to 12 hours after symptom onset if the initial measurements were negative. Troponin is the preferred marker to assess for cardiac damage. Once the initial assessments are complete, patients are categorized as having a high, intermediate, or low short-term risk of death or non-fatal MI (table 1).

Table 1. Short-term risk of death or non-fatal MI in patients with UA/NSTEMI.

<table>
<thead>
<tr>
<th>Feature</th>
<th>High Risk</th>
<th>Intermediate Risk</th>
<th>Low Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>History</td>
<td>Accelerating tempo of ischemic symptoms in preceding 48 h</td>
<td>Prior MI, peripheral or cerebrovascular disease, or CABG</td>
<td>No high- or intermediate-risk features but may have any of the following:</td>
</tr>
<tr>
<td></td>
<td>Prior aspirin use</td>
<td>Prior aspirin use</td>
<td>Prior aspirin use</td>
</tr>
</tbody>
</table>

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Character of pain

<table>
<thead>
<tr>
<th>Prolonged ongoing pain (greater than 20 minutes) at rest</th>
<th>Prolonged angina at rest (greater than 20 minutes), now resolved, with moderate or high likelihood of CAD</th>
<th>Increased angina frequency, severity, or duration; angina provoked at a lower threshold</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nocturnal angina</td>
<td>New-onset or progressive class III or IV angina in the past 2 weeks without prolonged rest pain but with intermediate or high likelihood of CAD</td>
<td>New onset angina within 2 weeks to 2 months prior to presentation</td>
</tr>
</tbody>
</table>

Clinical findings

| Pulmonary edema, new or worsening mitral regurgitation murmur, S₂ or new/ worsening rales, hypotension, bradycardia, tachycardia, and/ or age greater than 75 years | Age greater than 70 years |

ECG

| Angina at rest with transient ST-segment changes greater than 0.5 mm, new bundle branch block, and/or sustained ventricular tachycardia | T-wave changes and/or pathological Q wave changes or resting ST-depression less than 1 mm in multiple leads | Normal or unchanged ECG |

Cardiac markers

| Elevated cardiac troponin T, troponin I, or creatine kinase | Slightly elevated cardiac troponin T, troponin I, or creatine kinase | Normal |

*CABG = coronary artery bypass graft surgery; CAD = coronary artery disease

**Table 2. Criteria for selection of initial treatment strategy.**

<table>
<thead>
<tr>
<th>Preferred Strategy</th>
<th>Patient Characteristics*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conservative</td>
<td>• Low-risk patients</td>
</tr>
<tr>
<td></td>
<td>• Patient or physician preference in the absence of high-risk features</td>
</tr>
</tbody>
</table>

Immediate Management

The immediate management of patients presenting to the hospital with UA/NSTEMI should focus on general care and use of anti-ischemic therapies. General care includes placing patients on bed rest initially, providing supplemental oxygen to relieve hypoxemia, and continuous ECG monitoring. Patients with UA/NSTEMI with ongoing discomfort should receive sublingual NTG (0.4 mg) every 5 minutes for a total of 3 doses (if not already taken at home). Oral beta-blocker therapy should be administered within the first 24 hours to all patients (without contraindications to therapy). Intravenous NTG is indicated for the first 48 hours after UA/NSTEMI for patients who are unresponsive to sublingual NTG and beta-blockers or for patients with heart failure or hypertension. An oral angiotensin-converting enzyme (ACE) inhibitor should be given to patients with pulmonary congestion or left ventricular ejection fraction < 40% (without contraindications to therapy). If beta-blockers are contraindicated, a nondihydropyridine calcium channel blocker (verapamil or diltiazem) can be given in the absence of left ventricular dysfunction or other contraindications. An angiotensin receptor blocker should be administered to UA/NSTEMI patients intolerant to ACE inhibitors. All non-steroidal anti-inflammatory agents (excluding aspirin) should be discontinued at the time of presentation.

Aspirin should be administered to all UA/NSTEMI patients and continued indefinitely. A loading dose of clopidogrel followed by a daily maintenance dose should be given to patients who are unable to take or are intolerant to aspirin therapy. Patients with a history of gastrointestinal bleeding should receive a proton-pump inhibitor in combination with aspirin and/or clopidogrel therapy to minimize the risk of gastrointestinal complications. Recommendations for additional antiplatelet/anticoagulant therapy depends upon the initial management strategy (conservative versus invasive). A conservative management plan involves the use of intensive medical care without angiography, whereas an invasive strategy involves patients receiving a coronary angiography within 4 to 24 hours of admission. The preferred management strategy is chosen based on patient characteristics (table 2). For patients in whom an initial conservative strategy is selected, clopidogrel should be added to aspirin as soon as possible after admission and administered for at least 1 month and ideally up to a year. For patients in whom an invasive strategy is planned, clopidogrel and/or a glycoprotein IIb/IIIa inhibitor (eptifibatide or tirofiban) should be initiated before angiography. Anticoagulation therapy should be added to antiplatelet therapy as soon as possible after presentation. Unfractionated heparin, enoxaparin, and fondaparinux can be used for patients receiving conservative management, whereas unfractionated heparin, enoxaparin, fondaparinux, and bivalirudin are the preferred agents for patients receiving invasive management. Recommendations for subsequent antiplatelet/anticoagulation therapies depend upon how patients are further managed (percutaneous coronary intervention [PCI], coronary artery bypass graft surgery [CABG], etc.). Indications for PCI and/or CABG are beyond the scope of this summary.
Preferred Strategy | Patient Characteristics*  
--- | ---  
**Invasive**  
- Recurrent angina or ischemia at rest or with low-level activities despite intensive medical therapy  
- Elevated cardiac biomarkers (troponin)  
- New or presumably new ST-segment depression  
- Signs/symptoms of heart failure or new/worsening mitral regurgitation  
- High-risk patients/high-risk findings from noninvasive testing  
- Hemodynamic instability  
- Sustained ventricular tachycardia  
- PCI within 6 months  
- Prior CABG  
- Reduced left ventricular function (< 40%)  

PCI = percutaneous coronary intervention;  
CABG = coronary artery bypass graft surgery

Long-Term Medical Care  
Medications prescribed in the hospital are generally continued on an out-patient basis to control ischemia. The ACC/AHA guideline has specific recommendations for the long-term management of patients with UA/NSTEMI (table 3).

### Table 3. Long-term management of patients with UA/NSTEMI.*  

- **Antiplatelet therapy**  
  - For patients treated medically without stenting, aspirin 75 to 162 mg/day should be prescribed indefinitely and clopidogrel 75 mg/day should be prescribed for at least 1 month and ideally for up to 1 year.  
  - For patients treated with bare-metal stents: aspirin 162 to 325 mg/day should be prescribed for 1 month and then continued indefinitely at a dose of 75 to 162 mg/day and clopidogrel should be prescribed at a dose of 75 mg/day for a minimum of 1 month and ideally for up to 1 year.  
  - For patients treated with drug-eluting stents: aspirin 162 to 325 mg/day should be prescribed for at least 3 months after sirolimus-eluting stents and 6 months after paclitaxel-eluting stents and then continued indefinitely at a dose of 75 to 162 mg/day. Clopidogrel 75 mg/day should be given for at least 12 months to all patients with drug-eluting stent implantation.

- **Beta-blockers/calcium channel blockers**  
  - Beta-blockers are indicated for all patients unless contraindicated.  
  - Beta-blockers should be continued indefinitely.  
  - Calcium channel blockers are recommended for patients in whom beta-blockers are contraindicated or cause intolerable adverse effects.

- **Inhibition of renin-angiotensin-aldosterone system**  
  - ACE inhibitors should be given and continued indefinitely for all patients with heart failure, left ventricular dysfunction, hypertension, or diabetes mellitus, unless contraindicated.  
  - An angiotensin receptor blocker should be given to patients who are intolerant to ACE inhibitors.  
  - An aldosterone receptor blocker should be prescribed for patients who are already receiving therapeutic doses of an ACE inhibitor and have a left ventricular ejection fraction of < 40% and have either symptomatic heart failure or diabetes mellitus.

- **Nitroglycerin**  
  - Nitroglycerin should be used to treat ischemic symptoms in all patients.

- **Warfarin**  
  - Use of warfarin with aspirin and/or clopidogrel is associated with an increased risk of bleeding and should be monitored closely.

- **Lipids**  
  - A fasting lipid profile should be obtained from all patients within 24 hours of hospitalization.  
  - Lipid-lowering medications should be initiated prior to discharge.  
  - Statins are the preferred class of drugs for lipid lowering.  
  - Goal LDL is < 100 mg/dL and further titration to < 70 mg/dL is reasonable.

- **Diabetes mellitus**  
  - Diabetes management should include lifestyle and pharmacotherapy measures to maintain a hemoglobin A1c level of < 7%.

- **Smoking cessation**  
  - Smoking cessation and avoidance of environmental tobacco smoke are recommended.

- **Blood pressure**  
  - Blood pressure should be maintained at < 140/90 mm Hg or < 130/80 mm Hg for patients with diabetes mellitus or chronic kidney disease.

- **Weight management**  
  - Patients should be treated with beta-blockers and/or ACE inhibitors initially and other drugs such as thiazides should be added to achieve target blood pressure.  
  - Lifestyle modifications such as weight control, increased physical activity, alcohol moderation, sodium reduction, and increased consumption of fresh fruits, vegetables, and low-fat dairy products should be emphasized.

- **Physical activity**  
  - Patients should be encouraged to perform 30 to 60 minutes of physical activity per day, preferably 7 days per week.

- **Influenza**  
  - Patients should receive an annual influenza vaccination.

- **Depression**  
  - Patients should be screened for depression and referred for treatment when indicated.

- **Nonsteroidal anti-inflammatory drugs**  
  - Nonsteroidal anti-inflammatory agents should be avoided.

- **Hormone therapy**  
  - Hormone replacement therapy should not be given to postmenopausal women for secondary prevention of coronary events.

- **Antioxidant vitamins and folic acid**  
  - Vitamins E, C, beta-carotene, and folic acid, with or without B6 and B12, should not be used for secondary prevention of coronary events.

ACE = angiotensin-converting enzyme;  
LDL = low-density lipoprotein.
Chronic Obstructive Pulmonary Disease—an update on guidelines

Chronic obstructive pulmonary disease (COPD) is a progressive lung disease characterized by airflow obstruction that is not fully reversible. Symptoms of COPD result from both small airway disease and parenchymal destruction. Because of its progressive nature, COPD is associated with significant morbidity and mortality. The economic impact of COPD is also high, with direct and indirect costs estimated at $32 billion annually, based on 2002 data.

Several practice guidelines are available for management of COPD. The Global Initiative for Chronic Obstructive Lung Disease (GOLD) was developed from a collaboration of the World Health Organization and the U.S. National Heart, Blood, Lung Institute. Clinical practice guidelines have also been issued by the American College of Physicians. Both of these guidelines have been recently updated.

GOLD Guidelines

The GOLD guidelines for treatment of COPD were published in a 2007 issue of the American Journal of Respiratory and Critical Care Medicine. The GOLD guidelines address all aspects of COPD, including risk factors, diagnosis, staging, and treatment.

Table 1. Staging of COPD based on spirometric testing and symptoms.

| Stage I: Mild |
| - Mild airflow limitations (FEV<sub>1</sub>/FVC < 0.70; FEV<sub>1</sub> ≥ 80% predicted) |
| - Chronic cough or sputum production may be present |
| Stage II: Moderate |
| - Worsening of airflow limitations (FEV<sub>1</sub>/FVC < 0.70; 50% ≤ FEV<sub>1</sub> < 80% predicted) |
| - Shortness of breath with exertion |
| - Cough and sputum production may be present |
| Stage III: Severe |
| - Continued worsening of airflow limitation (FEV<sub>1</sub>/FVC < 0.70; 30% ≤ FEV<sub>1</sub> < 50% predicted) |
| - Increased shortness of breath |
| - Reduced exercise capacity |
| - Repeated exacerbations |
| Stage IV: Very severe |
| - Severe airflow limitation (FEV<sub>1</sub>/FVC < 0.70; 30% < FEV<sub>1</sub> predicted or < 50% predicted with chronic respiratory failure) |
| - Chronic respiratory failure |
| - Impaired quality of life with life-threatening exacerbations |

Treatment of COPD is based on 4 components—assessment and monitoring, reduction of risk factors, management of stable COPD, and management of exacerbations. Goals of treatment of COPD include symptom relief, prevention of disease progression, improving quality of life and health status, preventing exacerbations, and reducing mortality.

Pharmacotherapy of stable COPD

Once a diagnosis of COPD has been made and risk factors assessed and reduced (if possible), pharmacologic therapies can be used to manage the disease and improve quality of life. Although pharmacotherapy will not halt disease progression, it can decrease the symptoms of COPD and its complications. Bronchodilators are the primary treatment for COPD, given either on an as-needed or regular basis. The most commonly used bronchodilators include the beta2-agonists, anticholinergics, and methylxanthenes. Although the methylxanthenine theophylline is effective for improving symptoms of COPD, inhaled agents (either beta2-agonists or anticholinergics) are preferred due to reduced toxicity.

Regular use of long-acting bronchodilators is preferred over short-acting agents and may be more effective. For more severe disease, combinations of bronchodilators with different mechanisms of action (e.g., a short-acting beta2 agonist and an anticholinergic) are recommended and may produce greater improvements in lung function (based on FEV<sub>1</sub>) compared to either agent alone. Inhaled corticosteroids have also been recommended for use in COPD, for symptomatic patients (stages III or IV, with an FEV<sub>1</sub> <50%) with repeated exacerbations in order to reduce the number of exacerbations. However, none of these agents has been shown to reduce disease progression or decline in lung function associated with COPD. The GOLD recommendations for treatment of stable COPD are summarized in table 2.

Table 2. GOLD Step-wise approach to treatment of COPD.

<table>
<thead>
<tr>
<th>Stage I</th>
<th>Stage II</th>
<th>Stage III</th>
<th>Stage IV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Add short-acting bronchodilator (when needed)</td>
<td>Add regular treatment with one or more long-acting bronchodilators</td>
<td>Add inhaled corticosteroids if repeated exacerbations</td>
<td>Add long-term oxygen therapy</td>
</tr>
</tbody>
</table>

Combination of bronchodilators

Although the GOLD guidelines recommend combination bronchodilators for treatment of stable COPD, specific combinations are not given in the guidelines. The 2 classes of inhaled bronchodilators available (beta2-agonists and anticholinergics) are both effective for symptom relief in COPD. However, Tashkin and colleagues recently reviewed the evidence on the efficacy of bronchodilators in COPD and developed an algorithm for their use, with tiotropium the preferred long-acting bronchodilator. This was based on its more consistent efficacy on various outcomes for COPD. A short-acting bronchodilator is recommended for use with tiotropium for acute symptom relief; a beta2-agonist was the most commonly used short-acting rescue agent used during clinical trials.
In a separate publication, the combination of 2 anticholinergic agents—tiotropium plus ipratropium—was also investigated. In a small, double-blind, crossover trial, 60 adult patients with COPD were randomly assigned to add-on treatment with ipratropium 40 mcg, fenoterol (a short-acting beta2-agonist) 200 mcg, or placebo following 3 weeks of therapy with tiotropium. Compared to placebo, both ipratropium and fenoterol improved peak FEV₁ in the first 6 hours after dosing (p<0.0001 and p<0.002, vs placebo, respectively). However, the response seen in FEV₁ was greater with fenoterol compared to ipratropium, with a difference in peak response of 84 mL (p<0.0001). This difference increased to 160 mL following a second dose of short-acting bronchodilators (p<0.0001). For forced vital capacity (FVC) response, the effect was also greater with fenoterol, reaching statistical significance from both ipratropium and placebo. However, peak FVC responses for ipratropium and placebo were not significantly different.

### Exacerbations of COPD

Treatment of COPD exacerbations depends in part on the severity of the episode. For severe, nonlife-threatening exacerbations, oxygen therapy, bronchodilators, corticosteroids (oral or intravenous), and antibiotics can be considered. The dose or frequency of a bronchodilator can be increased, or combination therapy (a beta2-agonist and an anticholinergic agent) can be used. The addition of intravenous methylxanthines may also be effective.

Antibiotic therapy, either oral or intravenous, may be needed for some patients if signs of a bacterial infection are present. The most common bacteria found in exacerbations of COPD include *Haemophilus influenzae*, *Streptococcus pneumoniae*, and *Moraxella catarrhalis*; atypical pathogens include *Mycoplasma pneumoniae* and *Chlamydia pneumoniae*.

Antibiotics are generally recommended for:

- Patients with increased dyspnea, increased sputum volume, and increased sputum purulence;
- Patients with 2 of the above symptoms, if increased sputum purulence is one of the symptoms present;
- Patients requiring mechanical or nonmechanical ventilation

### American College of Physicians

The American College of Physicians (ACP) has also issued guidelines on the treatment of COPD. These guidelines were based, in part, on a recently published systematic review of literature by Wilt and colleagues which evaluated 8 meta-analyses and 42 randomized controlled trials on various pharmacologic therapies for COPD. Inhaled corticosteroids and inhaled long-acting bronchodilators (tiotropium or beta2-agonists) were both more effective than placebo in reducing exacerbations (relative risk reduction of 13 to 17%). No difference was seen between the short-acting anticholinergic ipratropium and placebo for reducing exacerbations. Treatments had a reduced effect on mortality. No significant effect was seen with inhaled monotherapy. Small risk reductions were seen with the combination of an inhaled beta2-agonist and an inhaled corticosteroid compared to placebo. However, no difference in mortality was seen between an inhaled long-acting beta2-agonist alone and the combination of an inhaled beta2-agonist and an inhaled corticosteroid. The recommendations from the ACP are given in table 4.

### Table 3. Recommended algorithm for treatment of COPD.

<table>
<thead>
<tr>
<th>GOLD Stage</th>
<th>Preferred</th>
<th>Alternative</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>As needed short-acting bronchodilator (ipratropium, albuterol, or combination)</td>
<td>Tiotropium plus albuterol</td>
</tr>
<tr>
<td>II</td>
<td>Tiotropium plus salmeterol or formoterol (a short-acting bronchodilator can be used for rescue; inhaled corticosteroids can be used if repeated exacerbations)</td>
<td>Salmeterol or formoterol plus ipratropium, albuterol or a combination</td>
</tr>
<tr>
<td>III</td>
<td>Tiotropium plus salmeterol or formoterol (a short-acting bronchodilator can be used for rescue; inhaled corticosteroids can be used if repeated exacerbations)</td>
<td>Salmeterol or formoterol plus tiotropium (a short-acting bronchodilator can be used for rescue; inhaled corticosteroids can be used if repeated exacerbations)</td>
</tr>
<tr>
<td>IV</td>
<td>Tiotropium plus salmeterol or formoterol plus inhaled corticosteroids (a short-acting bronchodilator can be used for rescue)</td>
<td>Tiotropium plus salmeterol or formoterol plus tiotropium (a short-acting bronchodilator can be used for rescue)</td>
</tr>
</tbody>
</table>

### Table 4. American College of Physicians treatment recommendations for COPD.

<table>
<thead>
<tr>
<th>Recommendation</th>
<th>Spirometry should be performed for patients with respiratory symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recommendation 1</td>
<td>Treatment for stable COPD should be reserved for patients with respiratory symptoms and clinically significant airflow obstruction (FEV₁ &lt; 60% of predicted)</td>
</tr>
<tr>
<td>Recommendation 2</td>
<td>Bronchodilators for relief of acute symptoms are not addressed</td>
</tr>
<tr>
<td>Recommendation 3</td>
<td>Treatment of COPD can include monotherapy with a long-acting inhaled beta2-agonist, a long-acting inhaled anticholinergic, or an inhaled corticosteroid</td>
</tr>
<tr>
<td>Recommendation 4</td>
<td>One monotherapy agent is not recommended over another due to insufficient evidence</td>
</tr>
<tr>
<td>Recommendation 5</td>
<td>Combination inhaled therapies may be considered for symptomatic patients and FEV₁ &lt; 60% predicted</td>
</tr>
<tr>
<td>Recommendation 6</td>
<td>Combinations of long-acting beta2-agonists and inhaled corticosteroids have reduced exacerbations compared to monotherapy</td>
</tr>
<tr>
<td>Recommendation 7</td>
<td>The addition of salmeterol-fluticasone to tiotropium resulted in improved lung function, quality of life, and reduced hospital admissions, but not exacerbations</td>
</tr>
</tbody>
</table>

### Summary

The Global Initiative for Chronic Obstructive Lung Disease
(GOLD) and the American College of Physicians have both released guidelines on the treatment of COPD. Although the GOLD guidelines are more comprehensive, both organizations have recommendations for pharmacologic therapy for COPD. Monotherapy with a long-acting inhaled bronchodilator is generally recommended for symptomatic patients with significant airflow obstruction. Additional agents (another long-acting bronchodilator or inhaled corticosteroids) are recommended for more severe symptoms.

New Asthma Guidelines

In August 2007, the National Heart, Lung, and Blood Institute’s (NHLBI) National Asthma Education and Prevention Program released the third expert panel guidelines for the diagnosis and management of asthma. The new asthma guidelines are divided into 4 key areas: assessment and monitoring, education, control of environmental factors and comorbid conditions, and medications. A summary of the major changes to the guidelines since the 1997 and 2002 updates are presented below.

Assessment and monitoring

An assessment of both impairment and risk to determine asthma severity and asthma control is emphasized in the new guidelines. Impairment is defined as the frequency and intensity of symptoms and functional limitations the patient is currently experiencing or has recently experienced and risk is defined as the likelihood of either asthma exacerbations, progressive decline in lung function, or risk of adverse events from medications. Assessment of both impairment and risk is recommended to determine initial treatment and subsequent maintenance therapy. At the initial assessment visit, asthma severity should be classified, precipitating factors and comorbid conditions should be identified, and patient’s knowledge and skills for self-management should be determined. The new guidelines modified the classification of asthma severity from “mild intermittent” to “intermittent” to emphasize that all patients with intermittent asthma, regardless of severity, can have severe asthma exacerbations. The importance of follow-up care is stressed in the guidelines. Clinic visits are recommended at 2- to 6-week intervals while gaining control; at 1- to 6-month intervals to monitor if sufficient control is maintained; and at 3-month intervals if a reduction in treatment is anticipated. Additionally, spirometry is recommended at the initial assessment visit and repeated every 1 to 2 years and more frequently for patients who are not well-controlled.

Education

The guidelines discuss the importance of an effective partnership between the clinician and patient with asthma. Specifically, the guidelines state that specific key educational messages should be tailored to the literacy level of the patient and taught/reinforced at every opportunity. These key messages include:

**Basic facts about asthma**

- The difference between the airways of a person with asthma versus one without the condition.
- The role of inflammation in asthma.

**Role of medications**

- The use of quick-relief medications to provide prompt relief of symptoms and that use of these medications more than twice a week indicates the need for starting or increasing long-term control medications.
- The use of long-term control medications to prevent symptoms and not to use these medications to obtain quick relief.

**Patient skills**

- Correct inhaler technique and use of devices such as spacers or nebulizers.
- Identifying and avoiding environmental exposures that worsen asthma.
- Self-monitoring by assessing daily symptoms or peak flow monitoring if patients have a difficult time perceiving symptoms
- Using a written asthma action plan.
- Seeking medical care as appropriate.

**Environmental factors and comorbidities**

The guidelines emphasize the importance of controlling both environmental factors and comorbid conditions that affect asthma control. Specifically, patients with asthma should reduce their exposure to irritants to which they are sensitive such as tobacco smoke, dust mites, animal dander, cockroaches, and indoor/outdoor mold, and pollen. Subcutaneous allergen immunotherapy is recommended for patients with persistent asthma when there is clear evidence of a relationship between symptoms and exposure to an allergen. Finally, comorbid conditions such as gastroesophageal reflux, obesity, obstructive sleep apnea, and rhinitis/sinusitis should be treated appropriately, as these conditions may impair asthma control.

**Medications**

The guidelines continue to promote a stepwise approach to therapy, with 6 recommended treatment steps replacing the original 4. Treatment approaches are now based on 3 age groups: 0–4 years, 5–11 years, and 12 years of age or older. The addition of the 5- to 11-year-old group is a recognition that drug responses differ between children and adults. Pharmacologic therapy is initiated based on asthma severity and adjusted (stepped up or down) based on level of asthma control. A summary of the recommended stepwise approach for the long-term management of asthma is presented in table 1.
Table 1. Stepwise approach for managing asthma long-term.*

<table>
<thead>
<tr>
<th>Children 0-4 years of age</th>
<th>Step 1</th>
<th>Step 2</th>
<th>Step 3</th>
<th>Step 4</th>
<th>Step 5</th>
<th>Step 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>SABA PRN</td>
<td>Low-dose ICS</td>
<td>Medium-dose ICS</td>
<td>Medium-dose ICS + LABA or Montelukast</td>
<td>High-dose ICS + Oral corticosteroids + LABA or Montelukast</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Children 5-11 years of age</th>
<th>Step 1</th>
<th>Step 2</th>
<th>Step 3</th>
<th>Step 4</th>
<th>Step 5</th>
<th>Step 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>SABA PRN</td>
<td>Low-dose ICS</td>
<td>Low-dose ICS + LABA, LTRA, or Theophylline OR Medium-dose ICS</td>
<td>Medium-dose ICS + LABA</td>
<td>High-dose ICS + LABA + Oral corticosteroids</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Youths 12 years of age or greater and Adults</th>
<th>Step 1</th>
<th>Step 2</th>
<th>Step 3</th>
<th>Step 4</th>
<th>Step 5</th>
<th>Step 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>SABA PRN</td>
<td>Low-dose ICS</td>
<td>Low-dose ICS + LABA OR Medium-dose ICS</td>
<td>Medium-dose ICS + LABA</td>
<td>High-dose ICS + LABA + Oral corticosteroids And Consider Omalizumab for patients who have allergies</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Additions: Deferoxirox (Exjade) Duloxetine (Cymbalta) Cefixime - Restricted to Emergency Department for Sexually Transmitted Disease

P&T Committee Formulary Action

Additions:
Deferoxirox (Exjade)
Duloxetine (Cymbalta)
Cefixime - Restricted to Emergency Department for Sexually Transmitted Disease

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