## INTRODUCTION 

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## DISEASE AND MATERNITY MANAGEMENT PROGRAM 

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Asthma is a major health concern for our member population. According to the Centers for Disease Control and Prevention’s National Health Interview Survey, 1999 to 2007, asthma affects approximately 16 million American adults and is a leading cause of chronic disease, affecting an estimated six million American children under the age of 18.¹

These Clinical Practice Guidelines for Asthma are based on the National Asthma Education and Prevention Program’s (NAEPP), *Expert Panel Report 3: Guidelines for the Diagnosis and Management of Asthma, Full Report 2007* and the 2006 Global Initiative for Asthma (GINA), National Heart, Lung and Blood Institute’s *Global Strategy for Asthma Management and Prevention*. Our Company revises disease-specific guidelines at a minimum of every two years, but earlier when critical scientific evidence emerges or updated national standards are published.

These recommendations are for your information only. They are not intended to be, and should not serve as, an exclusive course of treatment or a substitute for professional medical advice, diagnosis or treatment. Decisions regarding care are subject to individual consideration and should be made by the member in concert with the treating medical professionals. The information does not establish or imply coverage for any particular treatment or service. The recommended services may not be covered. Eligibility and coverage depend upon the specific terms and conditions of the member’s applicable benefit plan.

The Asthma Clinical Practice Guidelines 2010 provide an overview of evidence-based recommendations for outpatient asthma evaluation and management that stress: accurate diagnosis, monitoring and treatment based on level of disease control. These guidelines are intended to help improve quality of care and health outcomes by increasing practice consistency, while accelerating implementation of evidence-based treatments in everyday practice.
INITIAL EVALUATION

Asthma is usually characterized by episodic breathlessness, wheezing, cough and chest tightness associated with chronic inflammation of the airways. Clinical judgment is required for the diagnosis of asthma because signs and symptoms vary widely among patients and can change for a particular patient over time. The following must be established before diagnosing asthma:

- Episodic symptoms of airflow obstruction are present.
- Airflow obstruction is at least partially reversible.
- Alternative diagnoses have been excluded.

A detailed medical history, a thorough physical examination and pulmonary function testing all help establish a definitive diagnosis of asthma.

History
Key indicators increasing the probability of an asthma diagnosis include:

- Cough, particularly worse at night
- Recurrent wheezing
- Recurrent difficulty in breathing
- Recurrent chest tightness
- Symptoms occurring or worsening at night or in the presence of asthma triggers (see page 6 for list of asthma triggers)

Physical Examination
Evaluate for:

- Hyperexpansion of the thorax
- Wheezing or prolonged phase of forced exhalation
- Increased nasal secretions, mucosal swelling and/or nasal polyps
- Atopic dermatitis/eczema or other manifestation of an allergic skin condition
Pulmonary Function Testing

Patients may demonstrate poor symptom recognition and poor perception of symptom severity, especially when asthma has been long-standing. Objective measurement of lung function can confirm the diagnosis of asthma by quantifying the severity, reversibility and variability of airflow limitation.

Spirometry

Spirometry can detect the presence and extent of airflow obstruction and indicate whether the obstruction is reversible. Spirometry measurements (FEV₁, FVC, FEV₁/FVC, FEF 25–75, FEV₆) before and after administration of a short-acting bronchodilator help determine the degree of airflow obstruction and potential reversibility. Predicted values take into account patient characteristics and age.

Peak Expiratory Flow (PEF)

PEF meters are monitoring tools and should not be utilized to establish a diagnosis of asthma. PEF measurements obtained with different peak flow meters can vary and may underestimate the degree of airflow limitation.

Children under Age 5

Pulmonary function tests are generally not feasible or reproducible for children under age 5 because of inconsistent patient cooperation. Underdiagnosis is a frequent problem, especially in children who wheeze when they have respiratory infections. Recurrent episodes of cough and wheezing are most often due to asthma, and young children with asthma symptoms should be managed as having asthma once alternative diagnoses have been ruled out.

Other diagnostic considerations in infants and children:

- Allergic rhinitis and sinusitis
- Foreign body in trachea or bronchus
- Vocal cord dysfunction
- Vascular rings or laryngeal webs
- Laryngotracheomalacia, tracheal stenosis or bronchostenosis
- Enlarged lymph nodes or tumor
- Viral bronchiolitis or obliterative bronchiolitis
- Cystic fibrosis
- Bronchopulmonary dysplasia
- Heart disease
- Recurrent cough not due to asthma
- Aspiration from swallowing mechanism dysfunction or gastroesophageal reflux
MANAGEMENT

The goal of asthma management is to achieve asthma control, which can be accomplished by reducing functional impairment and risk.

Reducing functional impairment:
- Maintain normal activity levels (including exercise or other physical activity and attendance at work or school).
- Prevent chronic and troublesome symptoms (e.g., coughing or breathlessness).
- Require infrequent use of inhaled short-acting beta_2_-agonists (SABA) for quick relief of symptoms (≤ 2 days a week).
- Maintain normal or near normal pulmonary function.

Reducing risk:
- Prevent recurrent exacerbations of asthma and minimize the need for emergency room visits and hospitalizations.
- Prevent progressive loss of lung function; for children, prevent reduced lung growth.
- Provide optimal pharmacotherapy with minimal or no adverse effects.

Ongoing Monitoring

The first follow-up visit after establishing the diagnosis of asthma should be scheduled within one month of the initial evaluation. Subsequent office visits should be scheduled at regular one- to six-month intervals, based upon asthma control and treatment compliance. Follow-up office visits are recommended within two weeks after each asthma emergency room visit or inpatient admission.

Asthma assessments at every office visit should include the following: clinical history, physical examination, medication use, level of asthma control, patient compliance and pulmonary function testing, if appropriate.

History

The asthma clinical history should address the following:
- Nocturnal awakening
- Daytime symptoms (e.g., wheezing, cough, chest tightness, shortness of breath)
- Inability or difficulty performing normal activities (including exercise) because of asthma symptoms
- Asthma attacks since last visit
- Frequency/quantity of short acting beta_2_-agonist use (>2 days/week may indicate poor control)
- Peak flow record from home
- Risk factors (e.g., asthma triggers, comorbid conditions, immunizations, smoking status)
MANAGEMENT (cont.)

Physical Examination
The physical examination should include vital signs, particularly including documentation of the respiratory rate, and a pulmonary system examination.

Pulmonary Function Testing
Objective measures of lung function should be used to monitor the clinical course and response to therapy.

- Spirometry
  Follow-up spirometry measurements should be obtained:
  - After treatment is initiated and symptoms and peak expiratory flow have stabilized
  - During periods of progressive or prolonged loss of asthma control
  - At least every one to two years

- Peak expiratory flow (PEF)
  PEF monitoring is an important clinical tool, but is not recommended for all patients. PEF monitoring is recommended in the presence of moderate to severe persistent asthma, severe exacerbations, those with poor symptom recognition and those preferring to monitor their asthma with a peak flow meter.

Asthma Risk Factors

Asthma Triggers
The identification of potential asthma triggers is an essential component of a detailed medical history. Each medical record should indicate the attempts to identify patient exposure to any substance or factor demonstrated to increase asthma symptoms or precipitate an exacerbation. Asthma triggers can be classified into four categories: occupational exposures, irritants, inhalant allergens and other factors.

- Occupational exposure
  - Paint fumes
  - Strong odors
  - Wood dust

- Irritants
  - Tobacco smoke (associated with increased symptoms, decreased pulmonary function and greater use of health services)
  - Strong odors and sprays
  - Indoor/outdoor pollution
  - Formaldehyde and volatile organic compounds (sources include new linoleum flooring, synthetic carpeting, particle board, wall coverings, furniture and recent painting)
  - Wood stoves and fireplaces

- Inhalant allergens
  - House dust mites (most common allergen associated with asthma)
  - Animal allergens (e.g., dogs, cats, mice, rats and pet birds)
  - Cockroach allergens
  - Indoor and outdoor fungi (e.g., mold and mildew)
  - Outdoor allergens (e.g., pollens and grass)
Other factors
- Medication sensitivities (e.g., aspirin, nonsteroidal anti-inflammatory drugs, nonselective beta-blockers)
- Sulfites in foods and beverages
- Respiratory infections

Comorbid Conditions
When asthma is not well controlled despite patient compliance, evaluate for the presence of chronic comorbid conditions that may impede asthma management, such as:
- Sinusitis/rhinitis
- Gastroesophageal reflux disease (GERD)
- Obstructive sleep apnea (OSA)
- Allergic bronchopulmonary aspergillosis (ABPA)
- Chronic stress/depression
- Obesity (BMI ≥ 30)

Smoking Cessation
No one with asthma should smoke or be exposed to environmental tobacco smoke (ETS). Smoking status should be reviewed at every office visit. Those patients who smoke should be advised to quit and assistance should be offered to help them quit.

Classification of Asthma Severity and Control
Asthma severity should be classified before initiating treatment. The initial treatment should correspond to an appropriate severity category (i.e., intermittent, mild, moderate or severe persistent).

Once a treatment plan has been established, regular ongoing assessments of asthma control should take place. Determining whether therapy goals have been met and evaluating the need for dosing adjustments should be performed at every office visit.
Pharmacologic Treatment

Most asthma medications fall into two major groups, long-term control medications and quick-relief medications. Please refer to the Stepwise Tables 1 through 3 for age-specific pharmacologic treatment recommendations.

Long-Term Control Medications

Long-term control medications are believed to produce benefit chiefly through an anti-inflammatory effect. The minimum dose providing control should be identified through a process of regular follow-up visits and staged dose reductions.

- **Inhaled corticosteroids**
  Inhaled corticosteroids (ICS) are the preferred therapy for management of all patients with persistent asthma. Studies have demonstrated their efficacy in improving asthma control, quality of life and lung function. ICS also reduce the frequency and severity of exacerbations and asthma mortality.

- **Systemic corticosteroids**
  Short courses of this potent anti-inflammatory agent are often used to gain prompt control of the disease when initiating long-term therapy. Long-term oral systemic corticosteroid administration should be reserved for only the most severe, difficult-to-control asthma because of the high risk of side effects.

- **Leukotriene modifiers**
  Although not a preferred monotherapy for mild persistent asthma, leukotriene modifiers may be used as adjunctive therapy with ICS for those age 12 and older. This class of drugs has been shown to ease exercise-induced bronchoconstriction (EIB).

- **Long-acting beta2-agonists (LABAs)**
  LABAs should not be used as monotherapy. LABAs should be used in combination with ICS for long-term control and prevention of symptoms in individuals age 12 and older with moderate or severe persistent asthma. LABA use to prevent exercise-induced bronchoconstriction (EIB) is discouraged. The United States Food and Drug Administration (FDA) has enacted recent safety warnings stating long-term use of LABAs should be reserved for patients whose asthma cannot be adequately controlled on asthma controller medications alone. Pediatric and adolescent patients who require a LABA in addition to an inhaled corticosteroid should use a combination product containing both an inhaled corticosteroid and a LABA to ensure compliance with both medications (2010).

- **Methylxanthines**
  Sustained-release theophylline is a mild to moderate bronchodilator that can be used as non-preferred alternative monotherapy for mild persistent asthma. It may also be used as non-preferred alternative adjunctive therapy with an ICS. Monitoring of serum theophylline concentration is essential.
**Cromolyn sodium and nedocromil**
Although not a preferred monotherapy, cromolyn sodium and nedocromil can be used as alternatives for mild persistent asthma. Cromolyn sodium and nedocromil have also been used as preventive treatment prior to exercise to prevent EIB or unavoidable exposure to known allergens. Frequent, chronic use for EIB is discouraged.

**Immunomodulators**
Omalizumab (anti-IgE) is currently indicated as adjunctive therapy for uncontrolled severe allergic asthma in combination with moderate to high-dose ICS and LABAs for those age 12 and older. Evidence is strongest for immunotherapy with single allergens. The role of allergy in asthma is greater in children than in adults. Clinicians who administer immunotherapy should be prepared and equipped to identify and treat anaphylaxis should it occur.

**Quick-Relief Medications**
Quick-relief rescue medications are agents of choice for relief of bronchoconstriction and for pre-treatment of exercise-induced bronchoconstriction (EIB).

**Short-acting beta2-agonist**
Inhaled short-acting beta2-agonists (SABAs) are the preferred therapy for acute asthma symptoms and exacerbations and for preventing EIB. Using SABAs more than two days per week for symptom relief (not EIB) generally indicates inadequate control of asthma and the need for initiating or intensifying anti-inflammatory control. For example:
- Symptoms two times a week = four puffs per week
- Symptoms two times a week for four weeks = 16 puffs per month

There are 200 actuations in a canister; therefore one canister should last more than six months.
### Table 1: Stepwise Approach for Managing Asthma in Children up to Age 4.

**INTERMITTENT ASTHMA**

<table>
<thead>
<tr>
<th>Step 1</th>
<th>Preferred: SABA prn</th>
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<tr>
<td></td>
<td>Alternative: Cromolyn or Montelukast</td>
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**PERSISTENT ASTHMA (DAILY MEDICATION)**

Consult with asthma specialist if Step 3 care or higher is required. Consider consultation at Step 2.

<table>
<thead>
<tr>
<th>Step 2</th>
<th>Preferred: Medium-dose ICS</th>
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<tr>
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<td>Alternative: Low-dose ICS or Medium-dose ICS + either LABA or Montelukast</td>
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<tr>
<th>Step 3</th>
<th>Preferred: Medium-dose ICS + either LABA or Montelukast</th>
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<td>Alternative: Cromolyn or Montelukast</td>
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<tr>
<th>Step 4</th>
<th>Preferred: Medium-dose ICS + either LABA or Montelukast</th>
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<td>Alternative: Oral systemic corticosteroids</td>
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<tr>
<th>Step 5</th>
<th>Preferred: High-dose ICS + either LABA or Montelukast</th>
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<tr>
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<td>Alternative: Oral systemic corticosteroids</td>
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<tr>
<th>Step 6</th>
<th>Preferred: High-dose ICS + either LABA or Montelukast</th>
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<tr>
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<td>Alternative: Oral systemic corticosteroids</td>
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</table>

Each Step: Patient education and environmental control

**KEY** (alphabetical order)
- ICS (inhaled corticosteroid)
- LABA (inhaled long-acting beta<sub>2</sub>-agonist)
- SABA (inhaled short-acting beta<sub>2</sub>-agonist)

**QUICK-RELIEF MEDICATION** (all patients)
- SABA as needed for symptoms. Intensity of treatment depends on severity of symptoms.
- With viral respiratory infection: SABA every four to six hours up to 24 hours (longer with physician consult).
- Frequent use of SABA may indicate the need to step up treatment.

**NOTES**
- This approach is meant to assist, not replace, the clinical decision making required to meet individual patient needs.
- If alternative treatment is used and the response is inadequate, discontinue it and use the preferred treatment before stepping up.
- If a clear benefit is not observed within four to six weeks and the patient/family medication technique and adherence are satisfactory, consider adjusting the therapy or alternative diagnosis.
- Studies on children up to age 4 are limited. Step 2 preferred therapy is based on Evidence A. All other recommendations are based on expert opinion and extrapolation from studies in older children.

Table 2: Stepwise Approach for Managing Asthma in Children Ages 5 to 11.

### Intermittent Asthma

**Step 1**
- Preferred: SABA prn
- Alternative: Cromolyn, LTRA, Nedocromil or Theophylline

**Step 2**
- Preferred: Medium-dose ICS + LABA
- Alternative: Medium-dose ICS + either LTRA or Theophylline

**Step 3**
- Preferred: Medium-dose ICS + LABA
- Alternative: High-dose ICS + either LTRA or Theophylline

**Step 4**
- Preferred: High-dose ICS + LABA
- Alternative: High-dose ICS + either LTRA or Theophylline

**Step 5**
- Preferred: High-dose ICS + LABA
- Alternative: High-dose ICS + oral systemic corticosteroid

**Step 6**
- Preferred: High-dose ICS + LABA + oral systemic corticosteroid
- Alternative: High-dose ICS + oral systemic corticosteroid

### Persistent Asthma (Daily Medication)

- Consult with asthma specialist if Step 4 care or higher is required.
- Consider consultation at Step 3.

Assess control: check adherence, inhaler technique, environmental control and comorbid conditions.

Step up if needed and step down if possible (if well-controlled at least three months)

### Key

- ICS (inhaled corticosteroid)
- LABA (inhaled long-acting beta2-agonist)
- LTRA (leukotriene receptor antagonist)
- SABA (inhaled short-acting beta2-agonist)

### Quick-Relief Medication (all patients)

- SABA as needed for symptoms. Intensity of treatment depends on severity of symptoms: up to three treatments at 20-minute intervals as needed.
- Use of SABA more than two days a week for symptom relief (not prevention of EIB) generally indicates inadequate control and the need to step up treatment.

### Notes

- This approach is meant to assist, not replace, the clinical decision making required to meet individual patient needs.
- If alternative treatment is used and the response is inadequate, discontinue it and use the preferred treatment before stepping up.
- Theophylline is a less desirable alternative due to the need to monitor serum concentration levels.
- Step 1 and step 2 medications are based on Evidence A. Step 3 ICS + adjunctive therapy and ICS are based on Evidence B; efficacy of each treatment and extrapolation from comparator trials in older children and adults (comparator trials are not available for this age group); steps 4 through 6 are based on expert opinion and extrapolation from studies in older children and adults.
- Immunotherapy for steps 2 through 4 is based on Evidence B for house-dust mites, animal dander and pollens; evidence is weak or lacking for molds and cockroaches. Evidence is strongest for immunotherapy with single allergens. The role of allergy in asthma is greater in children than in adults. Clinicians who administer immunotherapy should be prepared and equipped to identify and treat anaphylaxis should it occur.

Table 3: Stepwise Approach for Managing Asthma for Ages 12 and Older.

**INTERMITTENT ASTHMA**

<table>
<thead>
<tr>
<th>Step 1</th>
<th>Preferred: SABA prn</th>
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**PERSISTENT ASTHMA** (DAILY MEDICATION)

<table>
<thead>
<tr>
<th>Step 2</th>
<th>Preferred: Low-dose ICS</th>
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<tbody>
<tr>
<td></td>
<td>Alternative: Cromolyn, LTRA, Nedocromil or Theophylline</td>
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<tr>
<th>Step 3</th>
<th>Preferred: Either Low-dose ICS + LABA or Medium-dose ICS</th>
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<tbody>
<tr>
<td></td>
<td>Alternative: Low-dose ICS + either LTRA, Theophylline or Zileuton</td>
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<tr>
<th>Step 4</th>
<th>Preferred: Medium-dose ICS + LABA</th>
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<tr>
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<td>Consider: Omalizumab for patients who have allergies</td>
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<tr>
<th>Step 5</th>
<th>Preferred: High-dose ICS + LABA</th>
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<tr>
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<td>Consider: Omalizumab for patients who have allergies</td>
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<tr>
<th>Step 6</th>
<th>Preferred: High-dose ICS + LABA + oral systemic corticosteroid</th>
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<tbody>
<tr>
<td></td>
<td>Consider: Omalizumab for patients who have allergies</td>
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</table>

Assess control: check adherence, inhaler technique, environmental control and comorbid conditions.  
Step up if needed and step down if possible (if well-controlled at least three months)

Each Step: Patient education, environmental control and management of comorbidities

Steps 2 through 4: Consider subcutaneous allergen immunotherapy for patients who have allergic asthma (see notes)

**KEY** (alphabetical order)

- EIB (exercise-induced bronchospasm)
- ICS (inhaled corticosteroid)
- LABA (inhaled long-acting beta₂-agonist)
- LTRA (leukotriene receptor antagonist)
- SABA (inhaled short-acting beta₂-agonist)

**QUICK-RELIEF MEDICATION** (all patients)

- SABA as needed for symptoms. Intensity of treatment depends on severity of symptoms: up to three treatments at 20-minute intervals as needed.
- Use of SABA more than two days a week for symptom relief (not prevention of EIB) generally indicates inadequate control and the need to step up treatment.

**NOTES**

- If alternative treatment is used and the response is inadequate, discontinue it and use the preferred treatment before stepping up.
- Zileuton is a less desirable alternative due to limited studies as adjunctive therapy and the need to monitor liver function. Theophylline requires monitoring of serum concentration levels.
- In step 6, before oral systemic corticosteroids are introduced, a trial of high-dose ICS + LABA + either LTRA, theophylline, or zileuton may be considered, although this approach has not been studied in clinical trials.
- Step 1, 2, and 3 preferred therapies are based on Evidence A; step 3 alternative therapy is based on Evidence A for LTRA, Evidence B for theophylline and Evidence D for zileuton. Step 4 preferred therapy is based on Evidence B, and alternative therapy is based on Evidence B for LTRA and theophylline and Evidence D for zileuton. Step 5 preferred therapy is based on Evidence B. Step 6 preferred therapy is based on (EPR-2 1997) and Evidence B for omalizumab.
- Immunotherapy for steps 2 through 4 is based on Evidence B for house-dust mites, animal dander and pollens; evidence is weak or lacking for molds and cockroaches. Evidence is strongest for immunotherapy with single allergens. The role of allergy in asthma is greater in children than in adults.

Referral
Consultation with an asthma specialist may be appropriate for asthmatics unresponsive to appropriate medical therapy, when symptoms are worsened or exacerbated by specific allergens or other factors. Specialty care may be provided by an allergist, pulmonologist or other physician with expertise in asthma management.

Patient Education
The goal is to provide the patient, family and other caregivers with necessary information and training to permit participation in routine activities and normal functions and to adjust treatment according to a medication plan developed with the healthcare professional.

Asthma education is essential for successful management of the disease. Patient education involves a partnership between the patient and healthcare professional. Patients knowledgeable about asthma have fewer emergency room visits, hospitalizations and missed work and school days due to asthma exacerbations. Patients should receive both verbal and written information regarding asthma. Frequently review with patients how to manage and control asthma signs/symptoms, basic facts about asthma, medication instructions, proper inhaler usage, spacer/holding chamber use, self-monitoring skills and how to use a written asthma action plan.

Identify Personal Goals
- Participate in physical activities without asthma symptoms.
- Sleep through the night without asthma symptoms.
- Have normal or near normal lung function.
- Have few or no emergency room visits and hospitalizations.
- Have few or no side effects from medications.

Basic Facts about Asthma
Emphasize that asthma is a chronic lung condition associated with inflammation of the airways that can be affected by a variety of triggers.

Asthma and Inflammation
- Inflammation is the most common feature of asthma.
- Inflammation may last for weeks following an episode.
- For most people with asthma, some degree of inflammation may exist all the time.
- Inflammation can be prevented or reduced with the use of long-term control medications.

PREVENTION CHECKLIST

Patient should avoid:
- Active smoking
- Passive smoking
- Beta-blockers (tablets and eye drops)
- Aspirin (and NSAIDS) if previously adversely affected.
- Occupational agents (to which the patient has been sensitized)

Patient should limit exposure to:
- Domestic mites
- Other common allergens
- Adverse occupational environments
- Food allergens and additives

Patient should always undertake:
- Normal social activities
- Exercise (other than in certain very adverse environmental conditions)
- Sports
Medications
The patient should receive information about the difference between long-term control medications and quick-relief medications. The healthcare professional should provide patient-specific drug information about dosing instructions, side effects and optimal dosing times for all medications prescribed.

Vaccinations
- **Influenza Vaccination**
  - The Advisory Committee on Immunization Practices of the Centers for Disease Control and Prevention (CDC) recommends annual seasonal influenza vaccination for persons over six months of age with chronic pulmonary conditions, including asthma (2009).
  - The live, attenuated influenza vaccine (nasal spray) is not recommended for people with asthma; the inactivated vaccine (flu shot) should be given instead.
  - In the event of a pandemic influenza outbreak, please refer to the CDC for the most current vaccination recommendations.

- **Pneumococcal Vaccination**
  - The CDC recommends pneumococcal polysaccharide vaccination (PPSV) for all adults with asthma. For persons ages 65 and older, a one-time revaccination is recommended if vaccinated five or more years previously and less than age 65 at the time of primary vaccination (2009).
  - For children with asthma, follow pneumococcal vaccine recommendations established by the Advisory Committee on Immunization Practices.

Inhalers
- All patients diagnosed with asthma should receive instruction in the proper use of a metered-dose inhaler (MDI), because training and skill are required to coordinate activation of the inhaler with the inhalation.
- Different techniques are used depending on the type of inhaler or medication (e.g., corticosteroids, inhaled dry powder, inhaled metered-dose, breath-actuated inhalers). The patient should follow the instructions provided and the inhalation technique should be reviewed regularly.

Spacers/Holding Chambers
A spacer/holding chamber operates a metered-dose inhaler (MDI) to deliver medication effectively. A spacer/holding chamber is recommended for all patients receiving medium or high doses of all inhaled corticosteroids via MDI. Instructions on benefits and user technique should be reviewed with all patients who have been prescribed a spacer/holding chamber. An MDI with a spacer/holding chamber is usually easier to use, particularly for children age 12 and younger and all patients with diminished digital dexterity or difficulty with coordination.

Peak Flow Meter
Peak flow meters are optional because of several limitations. Patients with moderate or severe persistent asthma and those with a history of severe exacerbations should be educated about the purpose and technique of home monitoring. This education should include verbal instruction in appropriate peak flow meter utilization and written material demonstrating correct peak flow meter technique.
The patient should be instructed about what information to communicate to the healthcare professional and asked to bring in their peak flow recordings, including any medications or symptoms associated with the readings.

Patients should be instructed in the proper method to determine their own personal best peak expiratory flow (PEF). Personal best PEF determinations are essential for all patients with moderate or severe persistent asthma, because patient symptoms alone may not indicate worsening asthma. A personal best PEF provides a patient-specific objective measure of worsening asthma.

**Asthma Diary**

Education should include information on how to keep a diary to record daily peak flow rates, which will enable the patient to self-manage asthma symptoms and detect warning signs that asthma is getting worse. A diary can help show when medications are working and when they are not.

**Example: Patient Asthma Diary**

| Date | Wheeze | Cough | Activity | Sleep | Quick Relief (Beta-Agonist) | Cromolyn/Nedocromil | Inhaled Steroid | Other Inhaled | Oral Steroid | Theophylline | Peak Flow | Comments |
|------|--------|-------|----------|-------|-----------------------------|----------------------|-----------------|--------------|--------------|-------------|-----------|----------|----------|
|      |        |       |          |       |                             |                      |                 |              |              |             |           |          |
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|      |        |       |          |       |                             |                      |                 |              |              |             |           |          |

**Source:** Plaut, T. F. Asthma peak flow diary improves care. Annals of Allergy Asthma Immunology (United States), May 1996, 76(5): 476-8.
Written Asthma Action Plan

A written asthma action plan, also called a self-management plan or personal action plan, is recommended for moderate to severe persistent asthma, difficult-to-control or poorly controlled asthma or a history of a severe exacerbation. The aim of a written plan is to enable guided self-management to control asthma symptoms day to day.

Both the peak flow and the symptom-based action plan are effective in increasing patient awareness of disease status and control. Action plans enhance patient-physician communication.

The healthcare professional is responsible for training patients to adjust their medications by following a prescriptive written action plan. The patient is responsible for recognizing the severity of signs and symptoms, or changes in peak flow rates, and is expected to make the appropriate treatment adjustments according to the plan laid out by their healthcare professional. Positive outcomes (e.g., reduction in hospitalizations, emergency room visits, unscheduled visits to the doctor for asthma, missed days of work, nocturnal wakening) were greatest when patient education included self-monitoring, regular review and patient-directed self-management using a written asthma action plan.
### GREEN ZONE

**Your Peak Flow Green Zone number** is anything more than _____________________________  
(80 percent of your personal best peak flow)

**Signs/Symptoms**
- Breathing is good with no cough, wheeze or chest tightness during work, school, exercise, play or sleep.
- Can do usual activities.

**Action**
Continue with your daily medications.

### YELLOW ZONE

**Your Peak Flow Yellow Zone number** is anything between _____________________________  
(50 to 80 percent of your personal best peak flow)

**Signs/Symptoms:**
- Asthma symptoms are present (cough, wheeze, chest tightness).
- Waking up at night due to asthma symptoms.
- Cannot do all usual activities.

**Actions:**
- Take _______ puffs of your quick-relief (bronchodilator) medicine ____________________
- Repeat ____________________
- Take _______ puffs of ___________________________ (anti-inflammatory) times/day
- Begin/increase treatment with oral steroids: Take _____ mg of ______________________ every a.m. p.m.
- Call your doctor (phone) __________________________ or emergency room (phone) ___________________________.

### RED ZONE

**Your Peak Flow Red Zone number** is anything below _____________________________  
(50 percent or less of your best peak flow)

**Signs/Symptoms:**
- You continue to get worse after increasing treatment according to the directions above
- Very short of breath

**Actions:**
- Take _______ puffs of your quick-relief (bronchodilator) medicine ____________________
- Repeat ____________________
- Take _______ mg of ___________________________ now.
- Call your doctor (phone) __________________________ or emergency room (phone) ___________________________
- Other important phone numbers for transportation__________________________

**Call your doctor at any time if:**
- Asthma symptoms worsen while you are taking oral steroids
- You have trouble walking and talking due to shortness of breath
- Inhaled bronchodilator treatments are not lasting four hours
- Your peak flow number remains or falls below _____________________________ in spite of following the plan.
REFERENCES


DISEASE AND MATERNITY MANAGEMENT PROGRAM

We are committed to serving the healthcare needs of our members. To assist individuals diagnosed with chronic diseases or who are pregnant, we offer the SuperWell® Disease and Maternity Management Program. The program helps pregnant members and those with chronic conditions to better understand and manage their condition by providing specially trained health coaches who offer structured education and support. In addition, health coaches work with the member to identify ways to avoid potential complications while stressing prescribed treatment plan compliance. Members benefit from routine monitoring by their health coach with program emphasis on improving a member’s overall well-being.

Programs

We currently offer the SuperWell Disease and Maternity Management Program for eligible members who are pregnant or those diagnosed with one or more of the following conditions:

- Congestive heart failure
- Chronic obstructive pulmonary disease
- Diabetes
- Coronary artery disease
- Asthma
- Chronic pain conditions
- Depression

For more information or to enroll a member, please call 800.861.4826, or visit one of our Web sites, MedMutual.com, ConsumersLife.com or CarolinaCarePlan.com.