Assessment

<table>
<thead>
<tr>
<th>Frequency of visits</th>
<th>Schedule regular visits, every 1-6 months.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Signs &amp; Symptoms</td>
<td>Signs and symptoms of asthma</td>
</tr>
<tr>
<td>Pulmonary Function</td>
<td>Lung sounds, respiratory status and peak flow</td>
</tr>
<tr>
<td></td>
<td>Use appropriate reference populations for adolescents</td>
</tr>
<tr>
<td>Functional Status</td>
<td>Quality of life/ functional status (missed school/work, reduced activity, sleep disturbances)</td>
</tr>
<tr>
<td>Medications</td>
<td>Usage, understanding, compliance and technique</td>
</tr>
<tr>
<td>Exacerbation History</td>
<td>History of exacerbations since last visit</td>
</tr>
<tr>
<td>Severity</td>
<td>Classify Asthma Severity (See attachments A, B)</td>
</tr>
<tr>
<td>Referral to Specialist (Pulmonologist, Allergist)</td>
<td>Recommended for patients &gt; 3 yrs of age if there are difficulties achieving or maintaining control of asthma or if the patient requires step 4 care. Consider for patients who require step 3 care. Recommended for patients &lt; 3 yrs of age if the child requires step 3 or 4 care. Consider if the child requires step 2 care</td>
</tr>
<tr>
<td>Psychosocial</td>
<td>For patients with significant psychiatric, psychosocial, or family problems that interfere with therapy, consider a Mental Health referral</td>
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</tbody>
</table>

Testing

<table>
<thead>
<tr>
<th>Spirometry</th>
<th>Spirometry is recommended (1) at the time of initial assessment, (2) after treatment is initiated and symptoms and PEF have stabilized, (3) at least every 1 to 2 years, (4) to evaluate the response to change in therapy</th>
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<tbody>
<tr>
<td>Peak Flow Monitoring</td>
<td>Monitor Peak Expiratory Flow (PEF) at each routine visit. Useful for patients generally &gt; 5 yrs old: • Instruct patients how to establish their personal best PEF and use as the basis for their action plan. • Check technique every visit. Short-term monitoring (twice daily for 2-3 weeks): • to establish the patient’s personal best PEF; • evaluate response to therapy changes; • identify relationship between changes in PEF and exposure to irritants or allergens; • during exacerbations Long-term daily monitoring is recommended for patients with: • moderate-to-severe persistent asthma, • poor symptom perception, • a history of severe exacerbations For patients with asthma symptoms but normal spirometry, assessment of diurnal variation in PEF over 1-2 weeks is recommended</td>
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<tr>
<td>Allergens</td>
<td>For patients with persistent asthma, consider skin testing or in vitro testing to assess sensitivity to perennial indoor allergens. Immunotherapy may be appropriate for some patients.</td>
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</table>
Medications
Severity determines treatment. See: Stepwise Approach to Managing Asthma -Attachment A (Adults and Ages >5yrs), Attachment B (Infants & children ≤ 5 yrs)

| Stepwise Approach | Use a Stepwise Approach to gain and maintain control
To gain control, either
1) start with high-dose therapy and step down (preferred) or
2) start at appropriate step and gradually step-up therapy
Gain control as quickly as possible, then step down treatment to the least medication necessary to maintain control
Monitor to ensure that control is achieved

All Asthmatics | Need an inhaled short-acting beta2-agonist for exacerbations.
Persistent Asthma | Requires both long-term control and quick relief medications
Intermittent Asthma | No daily long-term control medications
Quick relief medications: Short acting inhaled beta2- agonists as needed to treat symptoms
Inhaled beta2- agonists, cromolyn or nedocromil shortly before exercise (5-15 mins) for Exercise Induced Bronchospasm (EIB)

<table>
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<tr>
<th>Medication Class: Long-term Control Medications</th>
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<tr>
<td>Steroids</td>
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</table>
| Inhaled corticosteroids (ICS) are the most potent inhaled anti-inflammatory agent; most effective long-term therapy for persistent asthma.
ICS are well tolerated and safe at the recommended dosages.
Before increasing ICS dose, add-on therapy with another class of controller is preferred
Higher doses of ICS may be associated with possible, but not predictable, growth retardation (children) and systemic effects
- Local adverse effects: Oral candidiasis, dysphonia, reflex cough and bronchospasm
- Use Spacer/holding chamber, and mouth washing after use, to decrease local side effects and systemic absorption
- For children, monitor growth
- For postmenopausal women, consider calcium and Vitamin D supplements; ERT where appropriate

Non Steroid | Long-acting inhaled beta2-agonists:
Adjunctive therapy to ICS for maintaining control
Also prevents exercise-induced bronchospasm (EIB)
- Does not replace anti-inflammatory therapy
- Do not use to treat acute symptoms or exacerbations
- Inhaled are longer acting and have fewer side effects than oral sustained release beta2-agonists

Cromolyn Sodium and Nedocromil:
Anti-inflammatory agents with sound safety profiles
- Can be used as preventive treatment prior to exercise or unavoidable exposure to known allergens
- Clinical response is less predictable than response to ICS
Leukotriene modifiers
Although further clinical study is needed to establish role in therapy, may be considered as an alternative to low-dose ICS for long-term control of mild persistent asthma; alternative adjunctive therapy for moderate:
• Montelukast: adults and children ≥2yrs
• Zafirlukast: adults and children ≥ 5 yrs
  • Monitor prothrombin times closely for patients receiving zafirlukast and warfarin
• Ziluteron: adults and children ≥12yrs
  • Liver enzyme monitoring is recommended with Ziluteron; monitor warfarin, propanolol and theophylline dosing

Non Steroid
Methylxanthines: (Theophylline)
Sustained release theophylline as adjuvant to ICS for long-term control and prevention of symptoms, especially nocturnal symptoms
• Monitor serum concentration routinely due to significant toxicities

Medication Class: Initial Relief Medications
Short-acting inhaled beta2-agonists
Short-acting inhaled beta2-agonists (IBA) are the most effective medication for relieving acute bronchospasm; drug of choice for acute symptoms and exacerbations, and preventing EIB
• Increasing use or the use of >1.2 beta2-agonist canisters/month may indicate inadequate control
• Regularly scheduled, daily use of short-acting beta2-agonists is generally not recommended

Systemic Corticosteroids
Systemic corticosteroid, for moderate to severe exacerbations. Use at lowest effective dose. Continue short-term therapy until patient achieves 80% PEF personal best or symptoms resolve (usually 3-10 days) Potential adverse side-effects are generally not observed during short course of therapy. Time to action: 2-3 hours.

Other:
Anticholinergic
Ipratropium bromide may provide some additive benefit to inhaled beta2-agonists in severe asthma exacerbations. Alternative bronchodilator for patients who do not tolerate inhaled beta2-agonists. Time to action: 45 minutes.

Influenza Vaccine
Recommended annually for patients with persistent asthma

Varicella Vaccine
Recommended for:
• children ≥12months (See Preventive Health Guidelines)
• children requiring episodic systemic corticosteroid therapy and who have not had clinical varicella
Do not administer to patients on immunosuppressive doses, unless the dosage is discontinued for >1 month

Aerosol Delivery Devices
MDI: For > 5yrs old. (< 5 yrs old with spacer/holding chamber and face mask for some children)
Breath-actuated MDI: For > 5yrs old
DPI: Most consistent effects with >5yrs. May use for 4yrs olds
Spacer/Holding Chamber: For > 4yrs old; ≤4yrs, with a spacer/face mask. Recommend use with ICS by MDI
Nebulizer with face mask: For ≤2yrs and patients who cannot use other devices. Delivery method of choice for Cromolyn
• Optimal inhaler technique > 5 yrs old: Either open mouth with inhaler 1-2” away or with spacer/holding chamber
• Children’s ability to use different devices may vary considerably.
## Exacerbations

### Acute Exacerbations

Severity determines the treatment. Primary therapies include:
- Repetitive administration of short-acting beta2-agonist
- Early introduction of systemic corticosteroids
- Oxygen supplementation

Rapid deterioration can occur. Special attention is required for:
- Patients at high risk for asthma-related death
- Infants, due to greater risk for respiratory failure

Early treatment, according to a written action plan to guide self-management, is especially important for patients with moderate to severe persistent asthma.

### Exacerbations due to Viral Illness

Mild symptoms: Consider Inhaled Beta2-agonist q4-6 hrs x 24hrs, or longer as needed.
- If therapy needs to be repeated more than q6 weeks, a step-up in long-term care is recommended

## Education and counseling

### Education & Self-management

Teach self-management, and reinforce at every opportunity:
- Basic facts about asthma
- Roles of medications
- Skills: inhaler/spacer/holding chamber use, self-monitoring
- Environmental and control measures
- When and how to take rescue actions

Children ≥ 2 yrs old can begin learning about their asthma.

### Allergens and Irritants

Counsel all patients with asthma to avoid:
- Exposure to allergens to which they are sensitive.
- Exposure to environmental tobacco smoke.
- Exertion when levels of air pollution are high.
- Use of beta-blockers.
- Sulfite-containing and other foods to which they are sensitive

Other factors that can contribute to asthma severity: rhinitis, sinusitis, GERD, some medications, viral respiratory infections.

Counsel adult patients with severe persistent asthma, nasal polyps, or a history of sensitivity to aspirin or nonsteroidal anti-inflammatories regarding the risk of severe and even fatal exacerbations from using these drugs.

### Action Plan

The use of written self-management (action) plans has been shown to reduce morbidity with both adults and children.

Develop a written Action Plan with all asthmatic patients to guide:
- Self-management,
- Recognition of early signs,
- Appropriate intensification of therapy,
- Removal or allergic or irritant precipitants, and
- Prompt communication between patient and clinician

Base the written action plan on signs and symptoms and/or PEF.

Instruct patient how to use their plan.

For patient education, using the “traffic signal” Peak Flow Zone system for Action Plans, with specific instructions for action in each zone, may facilitate the patient’s self-management:
- Green Zone (80-100% of personal best) = Good control
- Yellow Zone (e.g. 60-<80%) = Caution
- Red Zone (e.g. <60%) = Danger. Medical Alert
Caretakers of children with asthma (teachers, coaches, sitters, etc) should have a copy and understand the action plan. Provide appropriate patients with a daily asthma diary.

### Smoking
Advise patients not to smoke, and to avoid smoke exposure. Tobacco smoke is a major precipitant of asthma symptoms in children and adults.

### Special Considerations

#### Antibiotics
Not recommended for treatment of acute asthma exacerbations except as needed for comorbid conditions.

#### Beta Blockers
Nonselective beta blockers can cause asthma symptoms in 25% of asthmatic patients who take them and thus nonselective beta blockers should be avoided with asthma patients.

#### MAOIs
Avoid sympathomimetic bronchodilators.

### Children

#### Infants and Young Children:
Diagnosis in infants can be difficult.
- Assess difficulty breathing, changes in respiration rate, altered sleep patterns, retractions, irritability, lethargy, decreased appetite, weight loss.
- Consider a diagnostic trial of inhaled bronchodilators and anti-inflammatory medication. Consider long-term control therapy for: >3 wheezing episodes in the past yr that lasted > 1 day and affected sleep and risk factors for development of asthma present
  - Risk factors: parental history of asthma or diagnosis of atopic dermatitis or 2 of a) diagnosed allergic rhinitis, b) wheezing apart from colds, c) peripheral blood eosinophilia

#### School-age Children and Adolescents:
Instruct parents and child in use of all medications, devices. Provide a written asthma management plan for the student’s school (including action plan, long-term control medication and prevention of EIB if appropriate, and trigger factors to avoid) Promote active participation in physical activities, exercise, and sports. Older children should be allowed to carry and self-administer quick relief medications (with physician and parent approval).

### Older Adults
Due to a high prevalence of other obstructive lung diseases, a 2-3 week trial of systemic steroids will determine disease reversibility.
- Asthma medications may have increased adverse effects in the elderly; adjust as needed
- Medications for other diseases may exacerbate asthma

### Pregnancy
Adequate control is essential during pregnancy. For most drugs used to treat asthma and rhinitis, there is little to suggest an increased risk to the fetus. (except brompheniramine, epinephrine, and alpha-adrenergic compounds)

### Managing Special Situations

#### Seasonal Asthma:
Treat according to the step-wise approach for long-term management.

#### Cough Variant:
Seen especially in young children, Cough is the principal symptom, occurring frequently at night. Monitor day and afternoon PEF. Therapeutic trials with ICS or bronchodilator may be helpful in diagnosis. Treat according to step-wise approach to long-
term management of asthma. Prolonged night cough may also be due to allergic rhinitis, sinusitis, GERD
Exercise-Induced Bronchospasm (EIB): Anticipate in all asthma patients. Teachers and coaches should be notified that a child has EIB. Recommended treatment is inhaled beta2-agonists (effective with 80% of patients), cromolyn sodium or nedocromil shortly before exercise (5-15 minutes).
Surgery: Evaluation before surgery should include review of symptoms, medication use, and measurement of pulmonary function. Attempt to improve lung function to predicted values or personal best. If systemic corticosteroids received during past 6 months, hydrocortisone IV should be given during surgical period.

This guideline is intended to provide information to aid health care providers and it is not a substitute for clinical judgement in treating individual patients. It is subject to updating pending the release and review of additional data, based upon changes in scientific knowledge and technology

References

American Psychiatric Association: Practice Guideline for the Treatment of Patients with Major Depressive Disorder (Revision). American Journal of Psychiatry 2000; 157 (April supplement)


PHP 2002 Preventive Health Recommendations
Attachment A
Stepwise Approach to Managing Asthma Long Term for Adults and Children > 5 years old

**Step 1**
Mild Intermittent
(PEF ≥80% Predicted)
PEF variability < 20%
- Symptoms < 2 days/week
- Nocturnal symptoms < 2 nights/month
- Asymptomatic and normal PEF between exacerbations
- Exacerbations brief (from a few hours to a few days); intensity may vary

**Step 2**
Mild-Persistent
(PEF ≥80% Predicted)
PEF variability 20-30%
- Symptoms > 2/week but < 1x/day
- Nocturnal symptoms 3-4/ month
- Exacerbations may affect activity

**Step 3**
Moderate-Persistent
(PEF >60-<80% Predicted)
PEF variability >30%
- Daily symptoms
- Nocturnal symptoms > 1x/wk
- Daily use of inhaled short-acting beta2-agonist
- Exacerbations affect activity
- Exacerbations ≥ 2 times a week; may last days

**Step 4**
Severe-Persistent
(PEF ≤60% Predicted)
PEF variability >30%
- Continual symptoms
- Frequent nocturnal symptoms
- Limited physical activity
- Frequent exacerbations

**Therapy***
Quick Relief:
Inhaled beta2-agonist as needed (<2 times/week)**

Long Term Control:
No daily Long-term control medication needed

(Severe exacerbations may occur separated by long periods of normal lung function and no symptoms. Recommended: Course of systemic corticosteroids)

**Except when used for exacerbations due to exercise-induced bronchospasm (EIB) or viral infection

**Education***
- Teach basic facts about asthma
- Teach inhaler/spacer/holding chamber technique
- Discuss roles of medications
- Develop self-management plan
- Develop action plan for when and how to take rescue actions, especially for patients with a history of severe exacerbations
- Discuss appropriate environmental control measures to avoid exposure to known allergens and irritants

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**Step Down**
Review treatment every 1 to 6 months; a gradual stepwise reduction in treatment may be possible.

**Step Up**
If control is not maintained, consider step up. First, review patient medication technique, adherence, and environmental control (avoidance of allergens or other factors that contribute to asthma severity).

* All therapy should include patient education about prevention (including environmental control where appropriate) as well as control of symptoms.
### Attachment B

**Stepwise Approach to Managing Infants and Children 0-5 years old with Acute or Chronic Asthma**

#### Step 1
**Mild Intermittent**
(PEFR>80% Predicted)

- Symptoms ≤ 2 days/week
- Nocturnal symptoms ≤ 2 nights/month
- Asymptomatic and normal PEF between exacerbations
- Exacerbations brief (from a few hours to a few days); intensity may vary

#### Step 2
**Mild-Persistent**
(PEFR>80% Predicted)

- Symptoms > 2/week but < 1/day
- Nocturnal symptoms 3-4 nights/month
- Exacerbations may affect activity

#### Step 3
**Moderate-Persistent**
(PEFR 60-80% Predicted)

- Daily symptoms
- Nocturnal symptoms ≥ 1 night/week
- Daily use of inhaled short-acting beta2-agonist and glucocorticoids
- Exacerbations affect activity

#### Step 4
**Severe-Persistent**
(PEFR<60% Predicted)

- Continual symptoms
- Frequent nocturnal symptoms
- Limited physical activity
- Frequent exacerbations

### Therapy*

#### Quick Relief:
- Inhaled short-acting beta2-agonist as needed (≤2wk)

#### Long Term Control:
- No daily Long-term control medication needed

#### Education*
- Teach basic facts about asthma
- Teach inhaler/spacer/holding chamber technique
- Discuss roles of medications
- Develop self-management plan
- Develop action plan for when and how to take rescue actions, especially for patients with a history of severe exacerbations
- Discuss appropriate environmental control measures to avoid exposure to known allergens and irritants
- Consider asthma specialist referral for children < 3 yrs for Step 2 Care

### Education*

#### Step Down
Review treatment every 1 to 6 months; a gradual stepwise reduction in treatment may be possible.

### Step Up
If control is not maintained, consider step up. First, review patient medication technique, adherence, and environmental control (avoidance of allergens or other factors that contribute to asthma severity).

* All therapy should include patient/parent education about prevention (including environmental control where appropriate) as well as control of symptoms.