# CARE GUIDE for ASTHMA

<table>
<thead>
<tr>
<th>Suggested Guidelines</th>
<th>Process</th>
<th>Important Findings, Measurements, and Values</th>
<th>Interventions</th>
<th>Follow – Up</th>
</tr>
</thead>
</table>
| Diagnosis (1,5,14,20) | • Confirm the diagnosis by establishing that patient has:  
  ➢ History of variable respiratory symptoms  
  ➢ Confirmed variable expiratory airflow limitation  
  ➢ document excessive variability in lung function, AND  
  ➢ document airflow limitation (Tests to document airflow limitation) | • Typical symptoms:  
  ➢ episodic wheezing  
  ➢ cough  
  ➢ chest tightness  
  ➢ shortness of breath | • Assess lung function:  
  ➢ at diagnosis or start of treatment  
  ➢ after 3-6 months of controller treatment to assess patient’s personal best FEV<sub>1</sub>  
  ➢ periodically thereafter | • Reassess as indicated |

**Criteria For Making the Diagnosis of Asthma**<sup>(1)</sup>

- The greater the variations, or the more occasions excess variation is seen, the more confident the diagnosis
- At least once during the diagnostic process when Forced Expiratory Volume in 1 second (FEV<sub>1</sub>) is low, confirm that FEV<sub>1</sub>/Forced Vital Capacity (FVC) is reduced (normally >0.75-0.80 in adults, >0.90 in children) Positive bronchodilator (BD) reversibility test. These tests can be repeated during symptoms or in the

**Spirometry or Spirometry with short-acting bronchodilator**

- Lung function testing:<sup>(1)</sup>  
  ➢ Should be done by well-trained operators with well-maintained and regularly calibrated equipment  
  ➢ FEV<sub>1</sub> from spirometry is more reliable than PEF  
  ➢ If PEF is used, the same meter should be used each time  
- Exclude alternative diagnoses  
- For difficult diagnosis: consider methacholine or histamine challenge, imaging, or referral to specialist
<table>
<thead>
<tr>
<th>can be repeated during symptoms or in the early morning (1)</th>
<th>morning early (more likely to be positive if BD medication is withheld before test: Short-Acting Beta2-Agonist (SABA) ≥4 hours, Long-Acting Beta2-Agonist (LABA) ≥15 hours)</th>
</tr>
</thead>
<tbody>
<tr>
<td>• When making diagnosis of asthma, consider the following:</td>
<td>o Adults: increase in FEV₁ of &gt;12% and &gt;200 mL from baseline, 10-15 minutes after 200-400 mcg Albuterol or equivalent (greater confidence if increase is &gt;15% and &gt;400 mL)</td>
</tr>
<tr>
<td>➢ Generally more than one type of respiratory symptoms present</td>
<td>o Children ≤ 5 years of age: increase in FEV₁ of &gt;12% predicted</td>
</tr>
<tr>
<td>➢ Symptoms come and go and may vary in intensity</td>
<td>➢ Excessive variability in twice-daily Peak Expiratory Flow (PEF) over 2 weeks. (These tests can be repeated during symptoms or in the early morning(1))</td>
</tr>
<tr>
<td>➢ Symptoms are often worse at night or on waking</td>
<td>o Adults: average daily diurnal PEF variability &gt;10%*</td>
</tr>
<tr>
<td>➢ Symptoms often appear following exposure to &quot;triggers&quot; including but not limited to cigarette smoke, allergens, cold air, animal dander, or exercise</td>
<td>o Children: average daily diurnal PEF variability &gt;13%*</td>
</tr>
<tr>
<td>➢ Symptoms may appear or worsen with viral infections</td>
<td>➢ Significant increase in lung function after 4 weeks of anti-inflammatory treatment</td>
</tr>
<tr>
<td>Adults: increase in FEV$_1$ or FVC$^{20}$ &gt;12% and &gt;200mL (or PEF by &gt;20% from baseline after 4 weeks of treatment, outside respiratory infections</td>
<td></td>
</tr>
<tr>
<td>Positive exercise challenge test</td>
<td></td>
</tr>
<tr>
<td>Adults: fall in FEV$_1$ of &gt;10% and &gt;200ml from baseline</td>
<td></td>
</tr>
<tr>
<td>Children: fall in FEV$_1$ of &gt;12% predicted, or PEF &gt;15%</td>
<td></td>
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<tr>
<td>Positive bronchial challenge test</td>
<td></td>
</tr>
<tr>
<td>Fall in FEV1 from baseline of ≥ 20% with standard doses of methacholine or histamine, or ≥ 15% with standardized hyperventilation, hypertonic saline or mannitol challenge</td>
<td></td>
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<tr>
<td>Excessive variation in lung function between visits (less reliable)</td>
<td></td>
</tr>
<tr>
<td>Adults: variation in FEV1 of &gt;12% and &gt;200 mL between visits, outside of respiratory infections</td>
<td></td>
</tr>
<tr>
<td>Children: variation in FEV1 of &gt;12% in FEV1 or &gt;15% in PEF between visits</td>
<td></td>
</tr>
</tbody>
</table>
### Assessment of Severity (1, 2)

<table>
<thead>
<tr>
<th>Level</th>
<th>severity</th>
<th>Initiate treatment according to severity of symptoms</th>
<th>Consider specialty referral for:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mild Asthma</td>
<td>Well controlled with Step 1 or 2 treatment (See table below)</td>
<td>• Modify therapy based on control</td>
<td>• Difficulty confirming diagnosis of asthma</td>
</tr>
<tr>
<td>Moderate Asthma</td>
<td>Well controlled with Step 3 treatment (See table below)</td>
<td>• In an acute care facility, oxygen saturation should be closely monitored by pulse oximetry. Pulse oximetry is useful in children who are unable to perform PEF</td>
<td>• Patient has symptoms of chronic infection, or features suggesting a cardiac or other non-pulmonary cause</td>
</tr>
<tr>
<td>Severe Asthma</td>
<td>Requires Step 4 or 5 treatment (See table below)</td>
<td>• Based on clinical urgency, saturation should be assessed before oxygen is started or 5 minutes after oxygen is removed or when saturation stabilizes</td>
<td>• Unclear diagnosis even after a trial of therapy or systemic corticosteroids</td>
</tr>
<tr>
<td>Risk factors associated with poor asthma outcomes: (Having one or more of these risk factors increases the risk of exacerbations even if symptoms are well controlled)</td>
<td></td>
<td>• Features of both asthma and COPD, there is doubt about priorities of treatment</td>
<td>• Features of both asthma and COPD, there is doubt about priorities of treatment</td>
</tr>
<tr>
<td>Uncontrolled asthma symptoms</td>
<td></td>
<td></td>
<td>• Suspected occupational asthma</td>
</tr>
<tr>
<td>Excessive Short Acting Beta Agonist (SABA) use (&gt;1 x 200-dose canister/month). This is also a risk factor for asthma-related death (1)</td>
<td></td>
<td>• Refer for confirmation of asthma and specific advice about eliminating exposure and pharmacological treatment</td>
<td></td>
</tr>
</tbody>
</table>

- **Classify asthma by level of treatment required to control:**
  - symptoms and exacerbations
  - Severity can be assessed (1)
  - once patient has been on controller treatment for several months and, if appropriate,
  - treatment step down has been attempted to find patient’s minimum effective level of treatment
- **Asthma severity may change over time, and classification depends not only on the severity**

- *“Daily diurnal PEF variability is calculated from twice daily PEF as ([day’s highest minus day’s lowest] / mean of day’s highest and lowest), and averaged over one week”*(1)

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1. Reference or note for further details.
<table>
<thead>
<tr>
<th>Risk Factors for Developing Fixed Airflow Limitation</th>
<th>Persistent Uncontrolled Asthma or Frequent Exacerbations</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Lack of ICS treatment</td>
<td>- Patient’s symptoms remain uncontrolled, or patients has ongoing exacerbations or low lung function despite correct inhaler technique and good adherence with Step 4 treatment</td>
</tr>
<tr>
<td>- Exposure to tobacco smoke, noxious</td>
<td>- Patient has frequent asthma-related urgent primary care visits and/or multiple Emergency Department (ED) visits</td>
</tr>
</tbody>
</table>

Risk factors for developing fixed airflow limitation include:
- Lack of ICS treatment
- Exposure to tobacco smoke, noxious

Persistent uncontrolled asthma or frequent exacerbations:
- Patient’s symptoms remain uncontrolled, or patients has ongoing exacerbations or low lung function despite correct inhaler technique and good adherence with Step 4 treatment
- Patient has frequent asthma-related urgent primary care visits and/or multiple Emergency Department (ED) visits

Any risk factors for asthma-related death:
- Near-fatal asthma attack that required Intensive Care Unit (ICU) admission, or mechanical ventilation for asthma at any time in the past
- Anaphylaxis or confirmed food allergy in a patient with asthma

Evidence of, or risk of, significant treatment side-effects:
- Patients with significant side-effects from treatment
- Need for long-term oral corticosteroid use
- Frequent courses of oral corticosteroids (e.g. two or more courses a year)

Symptoms suggesting complications or sub-types of asthma:
- e.g. aspirin-exacerbated respiratory disease
- Allergic bronchopulmonary aspergillosis

Additional reasons for children 6-11 years:
- Doubts about diagnosis of asthma, e.g. respiratory symptoms not responding well to treatment in a child who was born prematurely
- Symptoms or exacerbations remain uncontrolled despite moderate dose ICD with correct inhaler technique and good adherence
- Suspected side-effects of treatment (e.g. growth delay)
- Asthma and confirmed food allergy

- Assess future risk (risk of exacerbations, instability, rapid decline in lung function, side effects)
- Any exacerbation should prompt review of maintenance treatment to ensure that it is adequate

- Inadequate Inhaled Corticosteroid (ICS): not prescribed ICS; poor adherence: incorrect inhaler technique
- Major psychological or socioeconomic problems
- Frequent exacerbations in past year
- Ever intubated or in a critical care unit for asthma
- ≥1 severe exacerbation in last 12 months
- Low FEV₁, especially if <60% predicted
- Exposure to cigarette smoke, allergen exposure if sensitized
- Comorbidities: obesity, rhinosinusitis, confirmed food allergy
- Sputum of blood eosinophilia
- Pregnancy
- Monitor for respiratory infections throughout pregnancy, and
- Monitor asthma during labor and delivery

- Risk factors for developing fixed airflow limitation include:
  - Lack of ICS treatment
  - Exposure to tobacco smoke, noxious
<table>
<thead>
<tr>
<th>Chemicals, occupational exposures</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Low FEV₁, chronic mucus hypersecretion, sputum or blood eosinophilia</td>
</tr>
<tr>
<td>• Risk factors for medication side-effects</td>
</tr>
<tr>
<td>• Systemic</td>
</tr>
<tr>
<td>o Frequent Oral Corticosteroid (OCS),</td>
</tr>
<tr>
<td>o long term, high dose,</td>
</tr>
<tr>
<td>o and/or potent ICS; also taking P450 inhibitors</td>
</tr>
<tr>
<td>• Local</td>
</tr>
<tr>
<td>o High dose or potent ICS</td>
</tr>
<tr>
<td>o Poor inhaler technique</td>
</tr>
</tbody>
</table>

**Asthma Control**
(1.5,6.13,15,18,19,25,33)

- Determine degree of asthma control by assessing degree of:
  - Daytime symptoms
  - Nocturnal symptoms
  - Limitation of activities
  - Absence from work of school related to asthma symptoms

- Use validated asthma control assessment tool
- **Well controlled asthma**
  (All of the following are present)
  - Daytime symptoms - None
  - Nocturnal symptoms - None
  - Limitations of activities - None
  - Need for reliever/rescue treatment - None
  - Lung function (PEF or FEV₁)‡ Normal

- Control-based asthma management includes pharmacological and non-pharmacological treatment that is adjusted in a continuous cycle that involves assessment, treatment, and review(1)

**Pharmacologic Treatments**
- Make stepwise adjustments in therapy based on degree of asthma control. If a step-up in treatment is being considered for poor symptom control or exacerbations, check inhaler technique, check adherence and confirm that these symptoms are due to asthma (even in a patient with already-diagnosed asthma)
- Consider individual patient’s needs, preferences and circumstances (including cost) when recommending treatments in clinical practice
- When asthma symptoms have been well controlled and

**At every encounter**
- Need for reliever/rescue treatment
- Lung function (PEF or FEV₁) ↓
  - Identify those at high risk for severe attacks or for need of specialty care

- FEV₁ ≥ 80% predicted or ≥ 80% of personal best or in the green zone of the peak flow meter (adults and children ≥ 6 years of age)
- FEV₁/Forced Vital Capacity (FVC) ≥80% (children age 6-11)

- **Partly controlled asthma** - 1 or 2 of the following symptoms: (1)
  - Daytime symptoms
  - Nocturnal symptoms
  - Limitations of activities
  - Need for reliever/rescue treatment

- **Uncontrolled asthma** - 3 – 4 features of partly controlled asthma
- Consider an asthma control tool. An example is the ACT (asthma control test) in patients > 12 years of age; a self-administered questionnaire (5)
  - Scores range from 5–25 (higher is better). Scores of 20–25 are classified as well-controlled asthma; 16–20 as not well-controlled; and 5–15 as very poorly controlled asthma. The ACT lung function has been stable for 3+ months, and risk for exacerbations is low,(1) consider step down in therapy
  - Stepping down ICS doses by 25-50% at 3 month intervals is reasonable and safe for most patients
  - Patients should be taught:
    - the signs/symptoms of exacerbation
    - to follow their action plan
    - when to seek emergency medical treatment
    - Ensure patient has sufficient medication to resume previous dose if necessary.

Due to the high frequency of respiratory infections in pre-school children, the short-term use of oral or high dose inhaled corticosteroids for asthma exacerbations or wheezing episodes is not generally encouraged at this time. There is concern about the potential of long-term systemic effects, especially if the treatments are to be administered frequently(1)

Non-Pharmacologic Treatments (Evidence from endpoints of well designed RCTs or meta-analyses that provide a consistent pattern of findings in the population for which the recommendation is made.) (1)
- Cessation of smoking and ETS exposure
- Regular physical activity
- Avoidance of occupational exposures
- Healthy diet high in fruits and vegetables
- Remediation of dampness or mold in homes reduces asthma symptoms and medication use in adults
- Avoidance of medications that may make asthma worse (Aspirin and NSAIDs are not generally contraindicated unless there is a history of previous reactions to these agents)
- Bronchial thermoplasty (BT) may be considered in the treatment of patients with severe, persistent asthma who continue to be symptomatic despite maximal medical treatment with inhaled corticosteroid and LABA. It aims to reduce the smooth muscle mass in the airways by
| Spirometry \(^{(1,26)}\) | • Assess pulmonary function with spirometry to help establish a diagnosis, evaluate severity level, and monitor asthma control | • FEV\(_1\)  
• FEV\(_6\)  
• FEV\(_1\)/FVC  
• FEF 25-75% is an important indicator of small airways obstruction even with normal FEV\(_1\)/FVC and FEV\(_1\)\(^{(26)}\) | • Make stepwise adjustments in therapy based on degree of asthma control as assessed by history and spirometry  
• Consider using spirometry as an accuracy check of Peak flow readings; when more precision is needed in measuring lung function; when an individual’s capacity to accurately perform peak flow measurements is impaired by age, physical problems present or when technical problems are suspected | • Initial assessment  
• After treatment has begun and symptoms stabilized  
• During periods of progressive or prolong worsening  
• At least every 1-2 years |
|---|---|---|---|---|
| Triggers \(^{(1,8,14,26)}\) | • Assess allergen and trigger exposure  
• Assess medication triggers | • Exposure to dust mites, mold, cockroaches, first and second hand tobacco and other smoke, animals with fur, animal dander, foods, drugs, comorbid conditions, rodents, seasonal exposures such as grass, tree pollen, and weeds, occupational irritants, chemicals, or allergens, respiratory (viral) infections, exercise, strong emotional expressions/stress, endocrine factors (menses, pregnancy, thyroid disease) cold air, and chemical irritants/odors/ | • Trigger avoidance:  
➢ Multifaceted approach to allergen control based on sensitivities  
➢ Avoid exertion outdoors when pollution is heavy  
➢ Avoid exposure to first and second hand smoke  
➢ Avoid occupational exposure to specific triggers  
• Consider allergy testing for patients with persistent, non-seasonal asthma who are taking daily medication for their asthma  
• Treat rhinitis/sinusitis  
• Consider allergy immunotherapy  
• If a history of reaction to Aspirin/NSAIDs, these are contraindicated  
• If cardioselective beta-blockers are indicated for acute coronary events, asthma is not an absolute contra- | • Reassess as indicated  
• Consider referral to allergist or asthma specialist |
### Tobacco Use

(1,7,8,17,20-24,27,28,29)

- Provide smoking cessation counseling and other forms of treatment as a routine component of care
- Advise all individuals not to use tobacco products or e-cigarettes(27)
- Advise no exposure to environmental tobacco smoke at work, home and public places(28)

| fumes, environmental changes |
| Skin testing or in vitro testing for allergen sensitivity |
| Aspirin/Nonsteroidal anti-inflammatory drug (NSAID) allergy |
| Use of non-cardioselective Beta blockers |

| indication, but the relative risks/benefits should be considered. |

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**Think: 5 A’s**(7)

- **Ask** about smoking
- **Advise** user to quit
- **Assess** willingness to quit
- **Assist** user to quit (i.e., refer to smoking cessation program and consider pharmacotherapy
- **Arrange** follow-up

- Alcohol is associated with relapse so patients should consider limiting and/or abstaining from alcohol use while quitting tobacco (AHRQ)
- Anticipate triggers or challenges that may occur when stopping tobacco. Discuss these with the patient so they can develop a plan to deal with issues that arise (20)
- Strongly consider use of pharmacologic adjuvants; they can double or triple smoking cessation rates

**First line pharmacotherapy adjuvants**(20,21,29)

- Nicotine replacement
- Sustained-release bupropion
- Varenicline Delete per Dr. Wendling
- e-Cigarettes(21,29)
- Not FDA approved or regulated
- Not enough information about safety or effectiveness for cessation
- One of the FDA-approved safe and effective cessation medications is recommended

**Follow-up should begin within the first week after quit date. Second follow-up within the first month**(20)

- In person
- Via telephone

- Assess at each visit:
  - Smoking status
  - Weight gain
  - Nicotine withdrawal symptoms
| Asthma Self-Management ¹,7,11,12 | • Provide self-management education at multiple points of care including pharmacies, schools, ED’s and hospitals  
  • Self-management education should include:  
    ➢ Asthma information and training in management skills  
    ➢ Self-monitoring  
    ➢ Written Asthma action plan  
    ➢ Regular assessment by a consistent clinician | • Symptoms  
  • Home Peak Expiratory Flow (PEF) monitoring  
  • Inhaler technique  
  • Written asthma action plan  
  • Breathing exercises may be a useful supplement to asthma pharmacotherapy ¹ | • Asthma education: Use written material, interactive computer programs, mobile telephone-based interactive self-care systems, videos, individual or group sessions  
  • Tailor contents to patient’s age, culture, ethnicity, and social, emotional and disease status  
  • Consider home PEF monitoring in patients who have Moderate to severe persistent asthma, history of severe exacerbations, poor symptom perception, or a preference for this monitoring method  
  • Asthma action plan: Together with the patient, develop and provide each patient with a personalized written asthma action plan including instructions on daily management and how to recognize and manage worsening symptoms. The action plan may be based on symptoms or PEF readings or a combination of both  
  • Weight loss for all individuals with a BMI >30kg/m². Weight reduction in obese patients with asthma has been demonstrated to improve lung function, symptoms, morbidity, and health status  
  • Encourage patients with asthma to eat a diet high in fruits and vegetables for its general health benefits | • Reassess educational needs, self management goals, inhaler use, and action plan. Indicated at every opportunity in appropriate formats  
  • Include caregivers of both adults and minors  
  • Update or Review written asthma action plan at least annually |
| Immunizations ¹,5,10,20 | • Pneumococcal vaccination | • Document if patient has received a pneumococcal vaccination  
  • Document if adverse event occurs | • There are two different types of pneumococcal vaccines:  
  ➢ PCV13 (pneumococcal conjugate vaccine)  
  ➢ PPSV23 (pneumococcal polysaccharide vaccine)  
  • The CDC recommends: ¹⁰  
    ➢ Adults 19 through 64 years of age who have asthma receive PPSV23  
    ➢ Adults ≥65 years should receive PCV13 at least one year after PPSV23, followed by another dose of | • As indicated |
<table>
<thead>
<tr>
<th>Influenza Vaccine</th>
<th>Document if patient has received an influenza vaccination</th>
<th>Document if adverse event occurs</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PPSV23</strong> at least 1 year after PCV13 and at least 5 years after the last dose of PPSV2</td>
<td></td>
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</tr>
<tr>
<td>➢ Routine pneumococcal vaccination is not currently recommended by the CDC for American Indian/Alaska Native or other adults unless they have certain indications. See link for indications (<a href="http://www.cdc.gov/vaccines/schedules/hcp/imz/adult-conditions.html">http://www.cdc.gov/vaccines/schedules/hcp/imz/adult-conditions.html</a>)</td>
<td><strong><a href="http://www.cdc.gov/vaccines/schedules/hcp/adult.html">http://www.cdc.gov/vaccines/schedules/hcp/adult.html</a></strong></td>
<td></td>
</tr>
<tr>
<td>• Administer vaccine annually to all patients with asthma who are ≥ 6 months old</td>
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</tbody>
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<table>
<thead>
<tr>
<th>Depression/Anxiety (1,2,30,31,32)</th>
<th>Screen for presence of depression in adults aged ≥18 years, including pregnant and postpartum women (31)</th>
<th>Have an adequate system in place to assure an accurate diagnosis, effective treatment, and appropriate follow-up (31)</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Use validated depression screening tool such as the Patient Health Questionnaire (PHQ-2 or PHQ-9), Hospital Anxiety and Depression Scales in adults, the Geriatric Depression Scale in older adults, and the Edinburgh Postnatal Depression Scale (EPDS) in postpartum and pregnant women (31,32)</td>
<td></td>
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<tr>
<td>• Risk factors among the general adult populations vary by sex, age, race/ethnicity, education, marital status, geographical location, and employment status. Women, young and middle-aged adults, and</td>
<td></td>
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<tr>
<td></td>
<td>Assess for symptoms of anxiety often, especially during times of exacerbation</td>
<td>USPSTF recommends screening all adults who have not been screened previously (31)</td>
</tr>
<tr>
<td></td>
<td>Use clinical judgement and consideration of risk factors, comorbid conditions, and life events to determine if additional screening of high-risk patients is warranted (31)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Administer treatment and/or refer patients who meet criteria for depression to a mental health specialist</td>
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</tbody>
</table>

| Yearly | Screening is suggested at subsequent visits | Evaluate response to depression treatment with individualized follow-up contacts and adjust medication as indicated and/or confer with mental health specialist |
- Other groups at increased risk of developing depression are persons with chronic illnesses (e.g., cancer or cardiovascular disease), other mental health disorders (including substance misuse, or a family history of psychiatric disorders)\(^{(31)}\)
- Risk factors in older adults include disability, poor health status related to medical illness, complicated grief, sleep disturbances, loneliness, and history of depression age \(^{(31)}\)
- Effective treatment of depression in adults generally includes antidepressants or specific psychotherapy approaches (e.g., CBT or brief psychosocial counseling), alone or in combination\(^{(31)}\)

| Quality of Life (QOL) \(^{(1,2,3,4)}\) | • Assess QOL | • Areas of greatest importance include:  
- Missed work/school  
- Limitation of usual activities  
- Change in caregiver’s activity due to child’s asthma | • Assess QOL using a validated, asthma specific or generic QOL tool | • Annually or when indicated |
### Osteoporosis (1,2,9)

- Assess those at increased risk of osteoporosis
- Screening in adults with Asthma by dual energy X-Ray absorptionmetry (DXA scan) include:
  - Any individual with asthma who has been taking oral glucocorticosteroids ≥ 3 month's duration at a mean daily dose of ≥ 5mg¹ prednisone/prednisolone or above
  - Post-menopausal women taking ≥ 5 mg of prednisone/prednisolone/day for ≥ 3 months
  - Individuals with a possible osteoporosis-related fracture
  - Individuals taking high doses of inhaled corticosteroids (ICS)
- Measurement of bone mineral density (BMD) depends on the duration of and dose of ICS and oral corticosteroids, as well as any previous BMD scores

- Every 2 years in individuals whose initial scan was not osteoporotic but in whom treatment with oral glucocorticosteroids continues
- Every 1-2 years in individuals with osteoporosis on the first scan who are started on osteoporosis treatment

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¹ By definition, an exacerbation in any week makes that an uncontrolled asthma week

² Without administration of bronchodilator, lung function is not a reliable test for children 5 years and younger

- Provide reliever and controller medications based on severity assessment and degree of control
- Step up controller therapy until effective control is achieved
- In patients with good control for at least 3 months, step down therapy to minimum level needed to maintain control

<table>
<thead>
<tr>
<th>Age 0 – 5(^{(1)})</th>
<th>Age 6 – 11(^{(1)})</th>
<th>Age ≥ 12(^{(1)})</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Step 1</strong> (As-needed reliever medication)</td>
<td><strong>Preferred controller choice</strong>: as-needed SABA as reliever</td>
<td><strong>Preferred controller choice</strong>: as-needed SABA as reliever</td>
</tr>
<tr>
<td></td>
<td>Other controller options: For children with intermittent viral-induced wheeze and no interval symptoms in whom inhaled SABA medication is not sufficient, intermittent ICS may be considered.</td>
<td>Other controller options: low dose ICS should be considered, in addition to as-needed SABA for patients at risk of exacerbations.</td>
</tr>
<tr>
<td><strong>Step 2</strong> (As-needed reliever medication plus a single controller)</td>
<td><strong>Preferred controller choice</strong>: daily low dose(^8) ICS plus as-needed SABA as reliever</td>
<td><strong>Preferred controller choice</strong>: low dose ICS plus as-needed SABA as reliever</td>
</tr>
<tr>
<td></td>
<td>Other controller options: Leukotriene receptor antagonist (LTRA), intermittent ICS</td>
<td>Other controller options: LTRA</td>
</tr>
<tr>
<td><strong>Step 3</strong> (Reliever medication plus one or two)</td>
<td><strong>Preferred controller choice</strong>: Double “low dose” ICS(^8) plus as-needed SABA as</td>
<td><strong>Preferred controller choice</strong>: Medium dose ICS(^*) plus as-needed SABA</td>
</tr>
<tr>
<td>Step 4 (Reliever medication plus two or more controllers)</td>
<td>Preferred controller choice: Continue controller plus as-needed SABA and refer for specialist assessment</td>
<td>Other controller options: Addition of LTRA plus low dose ICS</td>
</tr>
<tr>
<td>---</td>
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</tr>
<tr>
<td>Step 5 (Reliever medication plus additional controller options)</td>
<td>NA</td>
<td>NA</td>
</tr>
</tbody>
</table>

Other controller options:
- Medium/high dose ICS*, low dose ICS + LTRA or sustained-release theophylline
- Add LTRA, increase ICS dose/frequency, add intermittent ICS
- The preferred controller choice for children 6-11 years of age is referral for expert assessment and advice if asthma is not well controlled on moderate dose ICS
- The preferred controller choice: Combination low dose ICS/formoterol as both maintenance and reliever treatment OR combination medium dose ICS*/LABA plus as-needed SABA
- Other controller options: Add Tiotropium by soft-mist inhaler for patients ≥ 12 yrs (1) of age with a history of exacerbations (1), High dose ICS* + LTRA OR sustained release theophylline

*Note: Step 4 and Step 5 are used for asthma management, with Step 4 focusing on reliever and controller options, and Step 5 providing additional controller options.
dose ICS/formoterol or SABA as reliever

Other controller options:
Tiotropium by soft-mist inhaler for patients ≥ 18 yrs of age with a history of exacerbations despite Step 4 treatment\(^{(1)}\), assess for bronchial thermoplasty\(^{(26)}\), add low dose oral glucocorticosteroid mepolizumab (anti-IL5) for patients ≥ 12 yrs of age with severe eosinophilic asthma that is uncontrolled on Step 4 treatment\(^{(1)}\)

**Legend**
ICS: inhaled corticosteroids
LABA: long-acting beta2 (β2)-agonist
SABA: short-acting beta2 (β2)-agonist
LTRA: Leukotriene receptor antagonist


http://www.nhlbi.nih.gov/guidelines/asthma/asthgdln.htm pp 291-296, 305


For children 6-11 years, theophylline is not recommended\(^{(1)}\)

* For all patients on medium-or-high-dose ICS delivered by a pressurized metered - dose inhaler, use of a spacer device is recommended.

** Low dose ICS/formoterol is the reliever medication for patients prescribed low dose budesonide/formoterol or low dose beclomethasone/formoterol maintenance and reliever therapy.

\[^{1}\] Low daily doses of inhaled corticosteroids for children 5 years and younger

<table>
<thead>
<tr>
<th>Drug</th>
<th>Low daily dose (mcg)</th>
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<tbody>
<tr>
<td>Beclomethasone dipropionate (HFA)</td>
<td>100</td>
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<tr>
<td>Budesonide pMDI + spacer</td>
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<tr>
<td>Budesonide nebulized</td>
<td>500</td>
</tr>
<tr>
<td>Fluticasone propionate (HFA)</td>
<td>100</td>
</tr>
<tr>
<td>Ciclesonide</td>
<td>160</td>
</tr>
<tr>
<td>Mometasone furoate</td>
<td>Not studied below age 4 years</td>
</tr>
<tr>
<td>Triamcinolone acetonide</td>
<td>Not studied in this age group</td>
</tr>
</tbody>
</table>

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Healthways Medical Integrity

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**Reference List**


5. Milstone, A. Pulmonary Diseases Specialist, Franklin, Tennessee


<table>
<thead>
<tr>
<th>Reference</th>
<th>Description</th>
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<tbody>
<tr>
<td>21. Naftilan, Allen J., Associate Professor of Medicine, Vanderbilt University Medical School; Clinical Director, The Heart Failure Program, The Vanderbilt Heart Institute, Nashville, Tennessee</td>
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