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National Asthma Education Prevention Program (NAEPP)

2007 Guidelines for the Diagnosis and Management of Asthma (EPR-3)

http://www.nhlbi.nih.gov/guidelines/asthma/index.htm
What is Asthma?

“Asthma is a common chronic disorder of the airways that involves a complex interaction of airflow obstruction, bronchial hyperresponsiveness and an underlying inflammation. This interaction can be highly variable among patients and within patients over time”.
Characteristics of Asthma

- Airway Inflammation
- Airway Obstruction (reversible)
- Hyperresponsiveness (irritability of airways)
Why Do We Need Asthma Guidelines?
Asthma:

- In 2008, it was estimated that 23.3 million Americans currently have asthma
- Is one of the most common chronic disorders in childhood, affecting an approx. 7.1 million children under 18 years (9.6%) ¹
- In 2007, 3,447 deaths were attributed to asthma, 152 deaths were children under the age of 15 ²
- Is the third leading cause of hospitalization among children under the age of 15 ³
- Is one of the leading causes of school absenteeism ⁴. In 2008 asthma accounted for approx. 14.4 million lost school days ⁴
- The annual health care costs of asthma is approx. $20.7 billion dollars ⁵

From ALA website 11/2010 www.Lungusa.org
1 CDC: National Center for Health Statistics, National Health Interview Survey Raw Data, 2009
3 CDC. National Center for Chronic Disease Prevention and Health Promotion. Healthy Youth! Health Topics: Asthma. August 14, 2009
4 CDC: National Center for Health Statistics, National Health Interview Survey Raw Data, 2008.
2007 - Guidelines for the Diagnosis & Management of Asthma

Expert Review Panel (EPR-3)
Asthma Guidelines: History & Context

- Initial guidelines released in 1991 and updated in 1997
- Updated again in 2002 (EPR-2) with a focus on several key questions about medications, monitoring and prevention
  - Long-term management of asthma in children
  - Combination therapy
  - Antibiotic use
  - Written asthma action plans (AAP) and peak flow meters (PFM)
  - Effects of early treatment on the progression of asthma
Old & New Asthma Guidelines: What has not changed

- Initial asthma therapy is determined by assessment of asthma severity
  - Ideally, before the patient is on a long-term controller
- Stepping therapy up or down is based on how well asthma is controlled or not controlled
- Inhaled corticosteroids (ICS) are the preferred first-line therapy for asthma
- Systemic steroids can still be used to treat asthma exacerbations
- Peak flows and written asthma action plans are recommended for asthma self management
  - Especially in moderate and severe persistent asthma, or for those with a history of severe exacerbations or poorly controlled asthma
Asthma Therapy Goals

“The goal of asthma therapy is to control asthma so patients can live active, full lives while minimizing their risk of asthma exacerbations and other problems”

Dr. William Busse, MD., chairman of the NAEPP EPR -3
2007 - Guidelines for the Diagnosis & Management of Asthma (EPR-3)

- (Almost) no new medications
- Restructuring into “severity” and “control”
- Domains of “impairment” and “risk”
- Six treatment steps (step-up/step-down)
- More careful thought into ongoing management issues
- Summarizes extensively-validated scientific evidence that the guidelines, when followed, lead to a significant reduction in the frequency and severity of asthma symptoms and improve quality of life
## New Strategies of the EPR-3

<table>
<thead>
<tr>
<th></th>
<th>Assessment</th>
<th>Management</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Severity</strong></td>
<td>The intrinsic intensity of the disease process</td>
<td>A clinical guide most useful for initiating controller therapy</td>
</tr>
<tr>
<td><strong>Control</strong></td>
<td>The degree to which symptoms are minimized &amp; goals are met</td>
<td>(After therapy is initiated) a clinical guide used to maintain or adjust therapy</td>
</tr>
<tr>
<td><strong>Responsiveness</strong></td>
<td>The ease of which prescribed therapy achieves asthma control</td>
<td>(Variable) frequent follow-up to step-up and step-down therapy to achieve the goal of control</td>
</tr>
</tbody>
</table>
Asthma is a chronic inflammatory disorder of the airways.

The immunohistopathologic features of asthma include inflammatory cell infiltration.

Airway inflammation contributes to airway hyperresponsiveness, airflow limitation, respiratory symptoms, and disease chronicity.

In some patients, persistent changes in airway structure occur, including sub-basement fibrosis, mucus hypersecretion, injury to epithelial cells, smooth muscle hypertrophy, and angiogenesis (remodeling).
Key Points: cont..

- Gene-by-environment interactions are important to the expression of asthma

- Atopy, the genetic predisposition for the development of an immunoglobulin E (IgE)-mediated response to common aeroallergens, is the strongest identifiable predisposing factor for developing asthma

- Viral respiratory infections are one of the most important causes of asthma exacerbation and may also contribute to the development of asthma
Causes – We Don’t Know...Yet!

- Asthma has dramatically risen worldwide over the past decades, particularly in developed countries, and experts are puzzled over the cause of this increase.

- Not all people with allergies have asthma, and not all cases of asthma can be explained by allergic response.

- Asthma is most likely caused by a convergence of factors that can include genes (probably several) and various environmental and biologic triggers:
  - e.g., infections, dietary patterns, hormonal changes in women, and allergens.
4 Components of Asthma Management

**Component 1:** Measures of Asthma Assessment & Monitoring

**Component 2:** Education for a Partnership in Asthma Care

**Component 3:** Control of Environmental Factors & Comorbid Conditions that Affect Asthma

**Component 4:** Medications
Component 1

Measures of Asthma Assessment & Monitoring
Key Points -
Overview: Measures of Asthma Assessment & Monitoring

*Assessment and monitoring are closely linked to the concepts of severity, control, and responsiveness to treatment:*

- **Severity** - intensity of the disease process. Severity is measured most easily and directly in a patient not receiving long-term-control therapy.
- **Control** - degree to which asthma (symptoms, functional impairments, and risks of unoward events) are minimized and the goals of therapy are met.
- **Responsiveness** - the ease with which asthma control is achieved by therapy.
Key Points – cont.

Domains

Assess Severity and Control based on:

- **Impairment** (Present):
  - Frequency and intensity of symptoms
  - Functional limitations (quality of life)

- **Risk** (Future):
  - Likelihood of asthma exacerbations or
  - Progressive loss of lung function (reduced lung growth)
  - Risk of adverse effects from medication
Key Points - cont.  
Severity & Control

*Are used as follows for managing asthma:*

- If the patient is **not** currently on a long-term controller at the first visit:
  - Assess asthma severity to determine the appropriate medication & treatment plan
- Once therapy is initiated, the emphasis is changed to the assessment of **asthma control**
  - The level of asthma control will guide decisions either to maintain or adjust therapy
Assessing Impairment (Present) Domain

- Assess by taking a careful, directed history and lung function measurement
- Assess Quality of Life using standardized questionnaires
  - Asthma Control Test (ACT)
  - Childhood Asthma Control Test
  - Asthma Control Questionnaire
  - Asthma Therapy Assessment Questionnaire (ATAQ) control index
- Some patients may perceive the severity of airflow obstruction poorly
Assessing Risk (Future) Domain

- Of adverse events in the future, especially of exacerbations and of progressive, irreversible loss of pulmonary function—is more problematic (airway remodeling)

- The test most used for assessing the risk of future adverse events is spirometry
Measures of Assessment & Monitoring

Diagnosis
Key Points – Diagnosis of Asthma

To establish a diagnosis of asthma the clinician should determine that:

– Episodic symptoms of airflow obstruction or airway hyperresponsiveness are present
– Airflow obstruction is at least partially reversible
– Alternative diagnoses are excluded
Key Points – Methods to Establish Diagnosis

Recommended methods to establish the diagnosis are:

- Detailed medical history
- Physical exam focusing on the upper respiratory tract, chest, and skin
- Spirometry to demonstrate obstruction and assess reversibility, including in children 5 years of age or older
- Additional studies to exclude alternate diagnoses
Key Indicators: Diagnosis of Asthma

Has/does the patient:
- had an attack or recurrent attacks of wheezing?
- have a troublesome cough at night?
- wheeze or cough after exercise?
- experience wheezing, chest tightness, or cough after exposure to airborne allergens or pollutants?
- colds ‘go to the chest’ or take more than 10 days to clear up?
- symptoms improved by appropriate asthma treatment?

Adapted from the GINA guidelines 2008
Characterization & Classification of Asthma

Severity
Key Points - Initial Assessment: Severity

- Once a diagnosis is established:
  - Identify precipitating factors (triggers)
  - Identify comorbidities that aggravate asthma
  - Assess the patient’s knowledge and skills for self-management
  - Classify severity using impairment and risk domains
- Pulmonary function testing (spirometry) to assess severity
# Assessment of Asthma Severity

## Previous Guidelines
- Frequency of daytime symptoms
- Frequency of nighttime symptoms
- Lung function

## 2007 Guidelines
- **Impairment**
  - Frequency of daytime /nighttime symptoms
  - Quality of life assessments
  - Frequency of SABA use
  - Interference with normal activity
  - Lung function (FEV₁/FVC)
- **Risk**
  - Exacerbations (frequency and severity)
**Components of Severity**

<table>
<thead>
<tr>
<th>Impairment</th>
<th>Classification of Asthma Severity (0–4 years of age)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Intermittent</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Mild</strong></td>
</tr>
<tr>
<td>Symptoms</td>
<td>≤2 days/week</td>
</tr>
<tr>
<td>Nighttime awakenings</td>
<td>0</td>
</tr>
<tr>
<td>Short-acting beta_2-agonist use for symptom control (not prevention of EIB)</td>
<td>≤2 days/week but not daily</td>
</tr>
<tr>
<td>Interference with normal activity</td>
<td>None</td>
</tr>
</tbody>
</table>

**Risk**

- Exacerbations requiring oral systemic corticosteroids: 0–1/year
- Consider severity and interval since last exacerbation. Frequency and severity may fluctuate over time.
- Exacerbations of any severity may occur in patients in any severity category.

**Recommended Step for Initiating Therapy**

<table>
<thead>
<tr>
<th>Step 1</th>
<th>Step 2</th>
<th>Step 3 and consider short course of oral systemic corticosteroids</th>
</tr>
</thead>
<tbody>
<tr>
<td>In 2–6 weeks, depending on severity, evaluate level of asthma control that is achieved. If no clear benefit is observed in 4–6 weeks, consider adjusting therapy or alternative diagnoses.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Level of severity is determined by both impairment and risk. Assess impairment by caregivers recall of previous 2-4 weeks.
**Classification of Asthma Severity (5–11 years of age)**

<table>
<thead>
<tr>
<th>Components of Severity</th>
<th>Intermittent</th>
<th>Persistent</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mild</td>
<td>Moderate</td>
</tr>
<tr>
<td>Symptoms</td>
<td>≤2 days/week</td>
<td>&gt;2 days/week but not daily</td>
</tr>
<tr>
<td>Nighttime awakenings</td>
<td>≤2x/month</td>
<td>3–4x/month</td>
</tr>
<tr>
<td>Short-acting beta&lt;sub&gt;2&lt;/sub&gt;-agonist use for symptom control (not prevention of EIB)</td>
<td>≤2 days/week</td>
<td>&gt;2 days/week but not daily</td>
</tr>
<tr>
<td>Interference with normal activity</td>
<td>None</td>
<td>Minor limitation</td>
</tr>
<tr>
<td><strong>Lung function</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Normal FEV&lt;sub&gt;1&lt;/sub&gt; between exacerbations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• FEV&lt;sub&gt;1&lt;/sub&gt; &gt;80% predicted</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• FEV&lt;sub&gt;1&lt;/sub&gt;/FVC &gt;85%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• FEV&lt;sub&gt;1&lt;/sub&gt; = &gt;80% predicted</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• FEV&lt;sub&gt;1&lt;/sub&gt;/FVC &gt;80%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• FEV&lt;sub&gt;1&lt;/sub&gt; = 60–80% predicted</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• FEV&lt;sub&gt;1&lt;/sub&gt;/FVC = 75–80%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• FEV&lt;sub&gt;1&lt;/sub&gt; &lt;60% predicted</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• FEV&lt;sub&gt;1&lt;/sub&gt;/FVC &lt;75%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Exacerbations requiring oral systemic corticosteroids**

- 0–1/year (see note)
- ≥2/year (see note)

Consider severity and interval since last exacerbation. Frequency and severity may fluctuate over time for patients in any severity category. Relative annual risk of exacerbations may be related to FEV<sub>1</sub>.

**Recommended Step for Initiating Therapy**

(See figure 4–1b for treatment steps.)

- **Step 1**
- **Step 2**
- Step 3, medium-dose ICS option
- Step 3, medium-dose ICS option, or step 4 and consider short course of oral systemic corticosteroids

In 2–6 weeks, evaluate level of asthma control that is achieved, and adjust therapy accordingly.
**NOT Currently Taking Controllers**

### Impairment

<table>
<thead>
<tr>
<th>Normal FEV₁/FVC:</th>
<th>8–19 yr</th>
<th>85%</th>
</tr>
</thead>
<tbody>
<tr>
<td>20–39 yr</td>
<td>80%</td>
<td></td>
</tr>
<tr>
<td>40–59 yr</td>
<td>75%</td>
<td></td>
</tr>
<tr>
<td>60–80 yr</td>
<td>70%</td>
<td></td>
</tr>
</tbody>
</table>

### Components of Severity

<table>
<thead>
<tr>
<th>Symptoms</th>
<th>≤2 days/week</th>
<th>&gt;2 days/week but not daily</th>
<th>Daily</th>
<th>Throughout the day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nighttime awakenings</td>
<td>≤2x/month</td>
<td>3–4x/month</td>
<td>&gt;1x/week but not nightly</td>
<td>Often 7x/week</td>
</tr>
</tbody>
</table>

### Short-acting beta₂-agonist use for symptom control (not prevention of EIB)

| ≤2 days/week | >2 days/week but not daily, and not more than 1x on any day | Daily | Several times per day |

### Interference with normal activity

| None | Minor limitation | Some limitation | Extremely limited |

### Lung function

<table>
<thead>
<tr>
<th>Intermittent</th>
<th>Persistent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal FEV₁ between exacerbations</td>
<td>FEV₁ &gt;80% predicted</td>
</tr>
<tr>
<td>FEV₁ &gt;80% predicted</td>
<td>FEV₁/FVC normal</td>
</tr>
<tr>
<td>FEV₁/FVC reduced &gt;5%</td>
<td>FEV₁/FVC reduced &gt;5%</td>
</tr>
</tbody>
</table>

### Exacerbations requiring oral systemic corticosteroids

<table>
<thead>
<tr>
<th>0–1/year (see note)</th>
<th>≥2/year (see note)</th>
</tr>
</thead>
</table>

- Consider severity and interval since last exacerbation.
- Frequency and severity may fluctuate over time for patients in any severity category.

### Risk

**Recommended Step for Initiating Treatment**

(See figure 4–5 for treatment steps.)

<table>
<thead>
<tr>
<th>Step 1</th>
<th>Step 2</th>
<th>Step 3</th>
<th>Step 4 or 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>In 2–6 weeks, evaluate level of asthma control that is achieved and adjust therapy accordingly.</td>
<td>and consider short course of oral systemic corticosteroids</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Classifying Severity AFTER Control is Achieved – All Ages

<table>
<thead>
<tr>
<th>Lowest level of treatment required to maintain control</th>
<th>Classification of Asthma Severity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Intermittent</td>
</tr>
<tr>
<td></td>
<td>Persistent</td>
</tr>
<tr>
<td></td>
<td>Mild</td>
</tr>
<tr>
<td></td>
<td>Moderate</td>
</tr>
<tr>
<td></td>
<td>Severe</td>
</tr>
<tr>
<td>Step 1</td>
<td>Step 2</td>
</tr>
<tr>
<td></td>
<td>Step 3</td>
</tr>
<tr>
<td></td>
<td>Step 4</td>
</tr>
<tr>
<td></td>
<td>Step 5</td>
</tr>
<tr>
<td></td>
<td>Step 6</td>
</tr>
</tbody>
</table>

(already on controller)
Periodic Assessment & Monitoring

Asthma Control
Key Points –
Asthma Control (Goals of Therapy)

*Reducing impairment*

- Prevent chronic & troublesome symptoms
- Prevent frequent use (< 2 days /wk) of inhaled SABA for symptoms
- Maintain (near) “normal” pulmonary function
- Maintain normal activity levels (including exercise and other physical activity and attendance at work or school)
- Meet patients’ and families’ expectations of and satisfaction with asthma care
Key Points – cont.

Reducing Risk
- Prevent recurrent exacerbations of asthma and minimize the need for ER visits and hospitalizations
- Prevent progressive loss of lung function - for children, prevent reduced lung growth
- Provide optimal pharmacotherapy with minimal or no adverse effects
  - Periodic assessments at 1-6 month intervals
  - Patient self-assessment (w/clinician)
  - Spirometry testing
Key Points cont. - Written AAP’s & PFM

- Provide to all patients a written AAP based on signs and symptoms and/or PEF
  - Written AAPs are particularly recommended for patients who have moderate or severe persistent asthma, a history of severe exacerbations or poorly controlled asthma.
- Whether PF monitoring, symptom monitoring (available data show similar benefits for each), or a combo of approaches is used, self-monitoring is important to the effective self-management of asthma.
Peak Flow Monitoring

Long-term daily PF monitoring can be helpful to:

- Detect early changes in asthma control that require adjustments in treatment:
- Evaluate responses to changes in treatment
- Provide a quantitative measure of impairment
Asthma Control = Asthma Goals

- Definition of asthma control is the same as asthma goals reducing impairment and risk
- Monitoring quality of life, any:
  - work or school missed because of asthma?
  - reduction in usual activities?
  - disturbances in sleep due to asthma?
  - Change in caregivers activities due to a child's asthma?
Responsiveness - Questions for Assessing Asthma Control

*Ask the patient:*

- Has your asthma awakened you at night or early morning?
- Have you needed more quick-relief medication (SABA) than usual?
- Have you needed any urgent medical care for your asthma, such as unscheduled visits to your provider, an UC clinic, or the ER?
- Are you participating in your usual and desired activities?
- If you are measuring your peak flow, has it been below your personal best?

Adapted from Global Initiative for Asthma: Pocket Guide for Asthma Management & Prevention. 1995
Responsiveness - Actions

Actions to consider:

- Assess whether the medications are being taken as prescribed
- Assess whether the medications are being inhaled with correct technique
- Assess lung function with spirometry and compare to previous measurement
- Adjust medications, as needed; either step up if control is inadequate or step down if control is maximized, to achieve the best control with the lowest dose of medication

Adapted from Global Initiative for Asthma: Pocket Guide for Asthma Management & Prevention.™ 1995
## Assessing Asthma Control in Children 0 - 4 Years of Age

### Classification of Asthma Control (Children 0–4 years of age)

<table>
<thead>
<tr>
<th>Impairment</th>
<th>Well Controlled</th>
<th>Not Well Controlled</th>
<th>Very Poorly Controlled</th>
</tr>
</thead>
<tbody>
<tr>
<td>Symptoms</td>
<td>≤2 days/week</td>
<td>&gt;2 days/week</td>
<td>Throughout the day</td>
</tr>
<tr>
<td>Nighttime awakenings</td>
<td>1x/month</td>
<td>&gt;1x/month</td>
<td>&gt;1x/week</td>
</tr>
<tr>
<td>Interference with normal activity</td>
<td>None</td>
<td>Some limitation</td>
<td>Extremely limited</td>
</tr>
<tr>
<td>Short-acting beta₂-agonist use for symptom control (not prevention of EIB)</td>
<td>≤2 days/week</td>
<td>&gt;2 days/week</td>
<td>Several times per day</td>
</tr>
</tbody>
</table>

### Risk

<table>
<thead>
<tr>
<th>Exacerbations requiring oral systemic corticosteroids</th>
<th>0–1/year</th>
<th>2–3/year</th>
<th>&gt;3/year</th>
</tr>
</thead>
</table>

Treatment-related adverse effects

Medication side effects can vary in intensity from none to very troublesome and worrisome. The level of intensity does not correlate to specific levels of control but should be considered in the overall assessment of risk.
### Assessing Asthma Control in Children 5 - 11 Years of Age

<table>
<thead>
<tr>
<th>Components of Control</th>
<th>Classification of Asthma Control (Children 5–11 years of age)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Well Controlled</strong></td>
</tr>
<tr>
<td><strong>Impairment</strong></td>
<td>≤2 days/week but not more than once on each day</td>
</tr>
<tr>
<td>Symptoms</td>
<td>≤1x/month</td>
</tr>
<tr>
<td>Nighttime awakenings</td>
<td>None</td>
</tr>
<tr>
<td>Interference with normal activity</td>
<td>≤2 days/week</td>
</tr>
<tr>
<td>Short-acting beta-2-agonist use for symptom control (not prevention of EIB)</td>
<td>&gt;80% predicted/personal best</td>
</tr>
<tr>
<td>Lung function</td>
<td></td>
</tr>
<tr>
<td>• FEV&lt;sub&gt;1&lt;/sub&gt; or peak flow</td>
<td>&gt;80%</td>
</tr>
<tr>
<td>• FEV&lt;sub&gt;1&lt;/sub&gt;/FVC</td>
<td>&gt;80%</td>
</tr>
<tr>
<td>Exacerbations requiring oral systemic corticosteroids</td>
<td>0–1/year</td>
</tr>
<tr>
<td>Risk Evaluation requires long-term followup.</td>
<td></td>
</tr>
<tr>
<td>Reduction in lung growth</td>
<td></td>
</tr>
<tr>
<td>Treatment-related adverse effects</td>
<td>Medication side effects can vary in intensity from none to very troublesome and worrisome. The level of intensity does not correlate to specific levels of control but should be considered in the overall assessment of risk.</td>
</tr>
</tbody>
</table>
### Assessing Asthma Control in Youths ≥12 Years of Age & Adults

<table>
<thead>
<tr>
<th>Components of Control</th>
<th>Classification of Asthma Control (Youths ≥12 years of age and adults)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Well-Controlled</td>
</tr>
<tr>
<td><strong>Impairment</strong></td>
<td></td>
</tr>
<tr>
<td>Symptoms</td>
<td>≤2 days/week</td>
</tr>
<tr>
<td>Nighttime awakening</td>
<td>≤2x/month</td>
</tr>
<tr>
<td>Interference with normal activity</td>
<td>None</td>
</tr>
<tr>
<td>Short-acting beta₂-agonist use for symptom control (not prevention of EIB)</td>
<td>≤2 days/week</td>
</tr>
<tr>
<td>FEV₁ or peak flow</td>
<td>&gt;80% predicted/personal best</td>
</tr>
<tr>
<td>Validated Questionnaires</td>
<td></td>
</tr>
<tr>
<td>ATAQ</td>
<td>0</td>
</tr>
<tr>
<td>ACQ</td>
<td>≤0.75*</td>
</tr>
<tr>
<td>ACT</td>
<td>≥20</td>
</tr>
<tr>
<td><strong>Risk</strong></td>
<td></td>
</tr>
<tr>
<td>Exacerbations</td>
<td>0–1/year</td>
</tr>
<tr>
<td></td>
<td>Consider severity and interval since last exacerbation</td>
</tr>
<tr>
<td>Progressive loss of lung function</td>
<td>Evaluation requires long-term followup care</td>
</tr>
<tr>
<td>Treatment-related adverse effects</td>
<td>Medication side effects can vary in intensity from none to very troublesome and worrisome. The level of intensity does not correlate to specific levels of control but should be considered in the overall assessment of risk.</td>
</tr>
</tbody>
</table>
Component 2

Education for a Partnership in Asthma Care
Key Points - Education

- Self management education is essential and should be integrated into all aspects of care; requires repetition and reinforcement
- Provide all patients with a written asthma action plan that includes 2 aspects:
  - Daily management
  - How to recognize & handle worsening asthma symptoms
- Regular review of the status of patients asthma control
  - Teach and reinforce at every opportunity
- Develop an active partnership with the patient and family
Key Points – Education cont.

- Encourage adherence by:
  - Choosing a tx regimen that achieves outcomes and addresses preferences important to the patient
  - Review the success of tx plan and make changes as needed
- Tailor the plan to needs of each patient
- Encourage community based interventions
- Asthma education provided by trained health professionals should be reimbursed and considered an integral part of effective asthma care! (AE-C)
Key Educational Messages

- Significance of diagnosis
- Inflammation as the underlying cause
- Controllers vs. quick-relievers
- How to use medication delivery devices
- Triggers, including 2nd hand smoke
- Home monitoring/ self-management
- How/when to contact the provider
- Need for continuous, on-going interaction w/the clinician to step up/down therapy
- Annual influenza vaccine
Other Educational Points of Care

- ER Department and hospital based
- Medication therapy management (Pharmacist)
- Community based
- Home based for caregivers including home based allergen/environmental assessment
- Computer based technology
- Case management for high-risk patients
Maintaining the Partnership

*Promote open communication w/patient and family by addressing at each visit:*

- Ask what concerns they have and what they want addressed during the visit
- Review short – term goals agreed to at the initial visit
- Review written AAP and steps to take – adjust as needed
- Encourage parents to take a copy of AAP to the school or childcare setting or send a copy to the school nurse
- Teach and reinforce key educational messages
- Provide simple, brief, written materials that reinforce the actions and skills taught
Component 3

Control of Environmental Factors & Comorbid Conditions that Affect Asthma
Key Points – Environmental Factors

All patients with asthma should:
- Reduce, if possible, exposure to allergens & irritants they are sensitive to
- Understand effective allergen avoidance is multifaceted and individual steps alone are ineffective
- Avoid exertion outdoors when levels of air pollution are high
- Avoid use of nonselective beta-blockers
- Avoid sulfite-containing and other foods they are sensitive to
- Avoid use of humidifiers (generally)
Key Points – Environmental Cont.

Clinicians should:

- Evaluate a patient for other chronic co-morbid conditions when asthma cannot be well controlled
- Encourage their asthma patients to receive a yearly influenza vaccination (inactivated)
- Consider allergen immunotherapy when appropriate
- Ask about possible occupational exposures, particularly those who have new-onset disease (work related asthma)
Component 4

Medications
Key Points - Medications

- **2 general classes:**
  - Long-term control medications
  - Quick-Relief medications
- **Controller medications:**
  - Corticosteroids
  - Long Acting Beta Agonists (LABA’s)
  - Leukotriene modifiers (LTRA)
  - Cromolyn & Nedocromil
  - **Methylxanthines:** (*Sustained-release theophylline*)
Key Points – Medications cont.

- **Quick-relief medications**
  - Short acting bronchodilators (SABA’s)
  - Systemic corticosteroids
  - Anticholinergics
Key Points: Safety of ICS’s

- ICS’s are the most effective long-term therapy available, are well tolerated & safe at recommended doses
- The potential but small risk of adverse events from the use of ICS treatment is well balanced by their efficacy
- The dose-response curve for ICS treatment begins to flatten at low to medium doses
- Most benefit is achieved with relatively low doses, whereas the risk of adverse effects increases with dose
Key Points: Reducing Potential Adverse Effects

- Spacers or valved holding chambers (VHCs) used with non-breath-activated MDIs reduce local side effects
  - There is little or no data on use of spacers with hydrofluoroalkane (HFA) MDIs
- Patients should rinse their mouths (rinse and spit) after (ICS) inhalation
- Use the lowest dose of ICS that maintains asthma control:
  - Evaluate patient adherence and inhaler technique as well as environmental factors before increasing the dose of ICS
- To achieve or maintain control of asthma, add a LABA to a low or medium dose of ICS rather than using a higher dose of ICS
- Monitor linear growth in children
Key Points:
Safety of Long-Acting Beta$_2$-Agonists (LABA’s)

- Adding a LABA to the tx of patients whose asthma is not well controlled on low- or medium-dose ICS improves lung function, decreases symptoms, and reduces exacerbations and use of SABA for quick relief in most patients.
- The FDA determined that a Black Box warning was warranted on all preparations containing a LABA.
- For patients who have asthma not sufficiently controlled with ICS alone, the option to increase the ICS dose should be given equal weight to the option of the addition of a LABA to ICS.
- It is not currently recommended that LABA be used for treatment of acute symptoms or exacerbations.
- LABAs are not to be used as monotherapy for long-term control.
FDA Recommendations for LABA’s
February 2010

- Are contraindicated without the use of an asthma controller medication such as an ICS
- Single-ingredient LABAs should only be used in combination with an asthma controller medication; they should not be used alone
- Should only be used long-term in patients whose asthma cannot be adequately controlled on asthma controller medications
FDA Recommendations for LABA’s Cont.

- Should be used for the shortest duration of time required to achieve control of asthma symptoms and discontinued, if possible, once asthma control is achieved.
- Patients should then be maintained on an asthma controller medication.
- Pediatric and adolescent patients who require the addition of a LABA to an ICS should use a combination product containing both an ICS and a LABA, to ensure compliance with both medications.
Key Points:
Safety of Short -Acting Beta₂-Agonists (SABA’s)

- SABAs are the most effective medication for relieving acute bronchospasm
- Increasing use of SABA treatment or using SABA >2 days a week for symptom relief (not prevention of EIB) indicates inadequate control of asthma
- Regularly scheduled, daily, chronic use of SABA is not recommended
Section 4

Managing Asthma Long Term

“The Stepwise Approach”
Key Points: Managing Asthma Long Term

*The goal of therapy is to control asthma by:*

- Reducing impairment
- Reducing risk

- A stepwise approach to medication therapy is recommended to gain and maintain asthma control
- Monitoring and follow-up is essential
“The goal of asthma therapy is to maintain long-term control of asthma with the least amount of medication and hence minimal risk for adverse effects”.

EPR-3, Section 4, P. 284
Principles of Step Therapy to Maintain Control

- **Step up** medication dose if symptoms are not controlled
- If very poorly controlled, consider an increase by 2 steps, add oral corticosteroids, or both
- Before increasing medication therapy, evaluate:
  - Exposure to environmental triggers
  - Adherence to therapy
  - For proper device technique
  - Co-morbidities
Follow-up Appointments

- Visits every 2-6 weeks until asthma control is achieved
- When control is achieved, follow-up every 3-6 months
- **Step-down in therapy:**
  - When asthma is well-controlled for at least 3 months
- Patients may relapse with total discontinuation or reduction of inhaled corticosteroids
### Assessing Control & Adjusting Therapy

**Children 0-4 Years of Age**

<table>
<thead>
<tr>
<th>Impairment</th>
<th>Well Controlled</th>
<th>Not Well Controlled</th>
<th>Very Poorly Controlled</th>
</tr>
</thead>
<tbody>
<tr>
<td>Symptoms</td>
<td>≤2 days/week</td>
<td>&gt;2 days/week</td>
<td>Throughout the day</td>
</tr>
<tr>
<td>Nighttime awakenings</td>
<td>≤1x/month</td>
<td>&gt;1x/month</td>
<td>&gt;1x/week</td>
</tr>
<tr>
<td>Interference with normal activity</td>
<td>None</td>
<td>Some limitation</td>
<td>Extremely limited</td>
</tr>
<tr>
<td>Short-acting beta₂-agonist use for symptom control (not prevention of EIB)</td>
<td>≤2 days/week</td>
<td>&gt;2 days/week</td>
<td>Several times per day</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Risk</th>
<th>Well Controlled</th>
<th>Not Well Controlled</th>
<th>Very Poorly Controlled</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exacerbations requiring oral systemic corticosteroids</td>
<td>0–1/year</td>
<td>2–3/year</td>
<td>&gt;3/year</td>
</tr>
</tbody>
</table>

| Treatment-related adverse effects | Medication side effects can vary in intensity from none to very troublesome and worrisome. The level of intensity does not correlate to specific levels of control but should be considered in the overall assessment of risk. |

### Recommended Action for Treatment

(See figure 4–1a for treatment steps.)

- Maintain current treatment.
- Regular followup every 1–6 months.
- Consider step down if well controlled for at least 3 months.

- Step up (1 step) and Reevaluate in 2–6 weeks.
- If no clear benefit in 4–6 weeks, consider alternative diagnoses or adjusting therapy.
- For side effects, consider alternative treatment options.

- Consider short course of oral systemic corticosteroids, Step up (1–2 steps), and Reevaluate in 2 weeks.
- If no clear benefit in 4–6 weeks, consider alternative diagnoses or adjusting therapy.
- For side effects, consider alternative treatment options.
Stepwise Approach for Managing Asthma in Children 0-4 Years of Age

**Persistent Asthma: Daily Medication**
Consult asthma specialist if step 3 care or higher is required.
Consider consultation at step 2

**Step 1**
Preferred SABA PRN

**Step 2**
Preferred Medium Dose ICS
Alternative Montelukast or Cromolyn

**Step 3**
Preferred Medium Dose ICS
AND
Either: Montelukast or LABA

**Step 4**
Preferred Medium Dose ICS
AND
Either: Montelukast or LABA

**Step 5**
Preferred High Dose ICS
AND
Either: Montelukast or LABA
AND
Oral corticosteroid

**Step 6**
Preferred High Dose ICS
AND
Either: Montelukast or LABA
AND
Oral corticosteroid

**Patient Education and Environmental Control at Each Step**
Quick-relief medication for **ALL** patients -SABA as needed for symptoms.
With VURI: SABA every 4-6 hours up to 24 hours.
Consider short course of corticosteroids with (or hx of) severe exacerbation

Step up if needed
(first check adherence, environmental control)

Assess control
Step down if possible
(and asthma is well controlled at least 3 months)
Assessing Control & Adjusting Therapy
Children 5-11 Years of Age

<table>
<thead>
<tr>
<th>Components of Control</th>
<th>Classification of Asthma Control (5–11 years of age)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Well Controlled</td>
</tr>
<tr>
<td><strong>Impairment</strong></td>
<td></td>
</tr>
<tr>
<td>Symptoms</td>
<td>≤2 days/week but not more than once on each day</td>
</tr>
<tr>
<td>Nighttime awakenings</td>
<td>≤1x/month</td>
</tr>
<tr>
<td>Interference with normal activity</td>
<td>None</td>
</tr>
<tr>
<td>Short-acting β₂-agonist use for symptom control (not prevention of EIB)</td>
<td>≤2 days/week</td>
</tr>
<tr>
<td>Lung function</td>
<td></td>
</tr>
<tr>
<td>• FEV₁ or peak flow</td>
<td>&gt;80% predicted/personal best</td>
</tr>
<tr>
<td>• FEV₁/FVC</td>
<td>&gt;80%</td>
</tr>
<tr>
<td><strong>Risk</strong></td>
<td></td>
</tr>
<tr>
<td>Exacerbations requiring oral systemic corticosteroids</td>
<td>0–1/year</td>
</tr>
<tr>
<td>Reduction in lung growth</td>
<td>Evaluation requires long-term followup.</td>
</tr>
<tr>
<td>Treatment-related adverse effects</td>
<td>Medication side effects can vary in intensity from none to very troublesome and worrisome. The level of intensity does not correlate to specific levels of control but should be considered in the overall assessment of risk.</td>
</tr>
</tbody>
</table>

**Recommended Action for Treatment**
*(See figure 4–1b for treatment steps.)*

- • Maintain current step.
- • Regular followup every 1–6 months.
- • Consider step down if well controlled for at least 3 months.

- • Step up at least 1 step and
- • Reevaluate in 2–6 weeks.
- • For side effects: consider alternative treatment options.

- • Consider short course of oral systemic corticosteroids,
- • Step up 1–2 steps, and
- • Reevaluate in 2 weeks.
- • For side effects, consider alternative treatment options.
### Stepwise Approach for managing asthma in children 5-11 years of age

#### Intermittent Asthma

Consult asthma specialist if step 4 care or higher is required. Consider consultation at step 3.

#### Patient Education and Environmental Control at Each Step

- **Quick-relief medication for ALL patients**: SABA as needed for symptoms. Short course of oral corticosteroids maybe needed.

### Step 1

**Preferred**
- SABA PRN

**Alternative**
- LTRA, Cromolyn, Nedocromil, or Theophylline

### Step 2

**Preferred**
- Low dose ICS

**Alternative**
- LTRA, Cromolyn, Nedocromil, or Theophylline

### Step 3

**Preferred**
- Medium Dose ICS + LABA
- Medium Dose ICS + either LTRA, or Theophylline

**Alternative**
- Medium Dose ICS + LABA
- Medium Dose ICS + either LTRA, or Theophylline

### Step 4

**Preferred**
- High Dose ICS + LABA
- High dose ICS + either LTRA, or Theophylline

**Alternative**
- High Dose ICS + LABA
- High dose ICS + either LTRA, or Theophylline

### Step 5

**Preferred**
- High Dose ICS + LABA + oral corticosteroid
- High dose ICS + either LTRA, or Theophylline + oral corticosteroid

**Alternative**
- High Dose ICS + LABA + oral corticosteroid
- High dose ICS + either LTRA, or Theophylline + oral corticosteroid

### Step 6

**Preferred**
- High Dose ICS + LABA + oral corticosteroid
- High dose ICS + either LTRA, or Theophylline + oral corticosteroid

**Alternative**
- High Dose ICS + LABA + oral corticosteroid
- High dose ICS + either LTRA, or Theophylline + oral corticosteroid

---

**Step up if needed**
- (first check adherence, environmental control, and comorbid conditions)

**Assess control**
- Step down if possible
  - (and asthma is well controlled at least 3 months)
## Assessing Control & Adjusting Therapy in Youths > 12 Years of Age & Adults

### Components of Control

<table>
<thead>
<tr>
<th>Impairment</th>
<th>Classification of Asthma Control (≥12 years of age)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Well Controlled</td>
</tr>
<tr>
<td>Symptoms</td>
<td>≤2 days/week</td>
</tr>
<tr>
<td>Nighttime awakenings</td>
<td>≤2x/month</td>
</tr>
<tr>
<td>Interference with normal activity</td>
<td>None</td>
</tr>
<tr>
<td>Short-acting beta₂-agonist use for symptom control (not prevention of EIB)</td>
<td>≤2 days/week</td>
</tr>
<tr>
<td>FEV₁ or peak flow</td>
<td>&gt;80% predicted/personal best</td>
</tr>
<tr>
<td>Validated questionnaires</td>
<td></td>
</tr>
<tr>
<td>ATAQ</td>
<td>0 ≤0.75* ≥20</td>
</tr>
<tr>
<td>ACQ</td>
<td></td>
</tr>
<tr>
<td>ACT</td>
<td></td>
</tr>
</tbody>
</table>

### Impairment

- **Exacerbations requiring oral systemic corticosteroids**: 0–1/year
- **Progressive loss of lung function**: Evaluation requires long-term followup care
- **Treatment-related adverse effects**: Medication side effects can vary in intensity from none to very troublesome and worrisome. The level of intensity does not correlate to specific levels of control but should be considered in the overall assessment of risk.

### Risk

### Recommended Action for Treatment

(see figure 4–5 for treatment steps)

- **Well Controlled**: Maintain current step.
- **Not Well Controlled**: Step up 1 step and Reevaluate in 2–6 weeks.
- **Very Poorly Controlled**: Consider short course of oral systemic corticosteroids, Step up 1–2 steps, and Reevaluate in 2 weeks.
- For side effects, consider alternative treatment options.

### Evaluation

- Medication side effects can vary in intensity from none to very troublesome and worrisome. The level of intensity does not correlate to specific levels of control but should be considered in the overall assessment of risk.
Stepwise Approach for Managing Asthma in Youths >12 Years of Age & Adults

**Persistent Asthma: Daily Medication**
Consult asthma specialist if step 4 care or higher is required. Consider consultation at step 3.

**Step 1**
*Preferred:*
SABA PRN

*Alternative:*
Cromolyn, LTRA, Nedocromil or Theophylline

**Step 2**
*Preferred:*
Low-dose ICS + LABA

*Alternative:*
Medium-dose ICS

**Step 3**
*Preferred:*
Low-dose ICS + LABA

*Alternative:*
Medium-dose ICS + either LTRA, Theophylline, or Zileuton

**Step 4**
*Preferred:*
High-dose ICS + LABA

*Alternative:*
Consider Omalizumab for patients who have allergies

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

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

AND

Consider Omalizumab for patients who have allergies

Each Step: Patient Education and Environmental Control and management of comorbidities

Steps 2 – 4: Consider subcutaneous allergen immunotherapy for patients who have allergic asthma

- Quick-relief medication for ALL patients - SABA as needed for symptoms: up to 3 tx @ 20 minute intervals prn. Short course of systemic corticosteroids may be needed.
- Use of SABA >2 days a week for symptom relief (not prevention of EIB) generally indicates inadequate control & the need to step up treatment.
Section 5

Managing Exacerbations of Asthma
Key Points –
Managing Exacerbations

*Early treatment of asthma exacerbations is the best strategy for management:*

- Patient education includes a written asthma action plan (AAP) to guide patient self-management of exacerbations
  - especially for patients who have moderate or severe persistent asthma and any patient who has a history of severe exacerbations
- A peak-flow-based plan for patients who have difficulty perceiving airflow obstruction and worsening asthma is recommended
Key Points – cont.

- Recognition of early signs of worsening asthma & taking prompt action
- Appropriate intensification of therapy, often including a short course of oral corticosteroids
- Removal or avoidance of the environmental factors contributing to the exacerbation
- Prompt communication between patient and clinician about any serious deterioration in symptoms or peak flow, decreased responsiveness to SABAs, or decreased duration of effect
Exacerbations Defined - RISK

- Are acute or subacute episodes of progressively worsening shortness of breath, cough, wheezing, and chest tightness? — or some combination of these symptoms
- Are characterized by decreases in expiratory airflow that can be documented and quantified by spirometry or peak expiratory flow
  - These objective measures more reliably indicate the severity of an exacerbation than does the severity of symptoms
## Classifying Severity of Asthma Exacerbations in the UC or ER Setting

<table>
<thead>
<tr>
<th>Severity</th>
<th>Symptoms &amp; Signs</th>
<th>Initial PEF (or FEV₁)</th>
<th>Clinical Course</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mild</strong></td>
<td>Dyspnea only with activity (assess tachypnea in young children)</td>
<td>PEF ≥70 percent predicted or personal best</td>
<td>• Usually cared for at home&lt;br&gt;• Prompt relief with inhaled SABA&lt;br&gt;• Possible short course of oral systemic corticosteroids</td>
</tr>
<tr>
<td><strong>Moderate</strong></td>
<td>Dyspnea interferes with or limits usual activity</td>
<td>PEF 40–69 percent predicted or personal best</td>
<td>• Usually requires office or ED visit&lt;br&gt;• Relief from freq. inhaled SABA&lt;br&gt;• Oral systemic corticosteroids; some symptoms last 1–2 days after treatment is begun</td>
</tr>
<tr>
<td><strong>Severe</strong></td>
<td>Dyspnea at rest; interferes with conversation</td>
<td>PEF &lt;40 percent predicted or personal best</td>
<td>• Usually requires ED visit and likely hospitalization&lt;br&gt;• Partial relief from frequent inhaled SABA&lt;br&gt;• PO systemic corticosteroids; some symptoms last &gt;3 days after treatment is begun&lt;br&gt;• Adjunctive therapies are helpful</td>
</tr>
<tr>
<td><strong>Subset: Life threatening</strong></td>
<td>Too dyspneic to speak; perspiring</td>
<td>PEF &lt;25 percent predicted or personal best</td>
<td>• Requires ED/hospitalization; possible ICU&lt;br&gt;• Minimal or no relief w/ frequent inhaled SABA&lt;br&gt;• Intravenous corticosteroids&lt;br&gt;• Adjunctive therapies are helpful</td>
</tr>
</tbody>
</table>
Managing Asthma Exacerbations at Home

Assess Severity

- **Patients at high risk for a fatal attack** (see figure 5–2a) require immediate medical attention after initial treatment.
- Symptoms and signs suggestive of a more serious exacerbation such as marked breathlessness, inability to speak more than short phrases, use of accessory muscles, or drowsiness (see figure 5–3) should result in initial treatment while immediately consulting with a clinician.
- Less severe signs and symptoms can be treated initially with assessment of response to therapy and further steps as listed below.
- If available, measure PEF—values of 50–79% predicted or personal best indicate the need for quick-relief medication. Depending on the response to treatment, contact with a clinician may also be indicated. Values below 50% indicate the need for immediate medical care.

Initial Treatment

- **Inhaled SABA**: up to two treatments 20 minutes apart of 2–6 puffs by metered-dose inhaler (MDI) or nebulizer treatments.
- Note: Medication delivery is highly variable. Children and individuals who have exacerbations of lesser severity may need fewer puffs than suggested above.

Good Response

No wheezing or dyspnea (assess tachypnea in young children).
PEF ≥80% predicted or personal best.
- Contact clinician for followup instructions and further management.
- May continue inhaled SABA every 3–4 hours for 24–48 hours.
- Consider short course of oral systemic corticosteroids.

Incomplete Response

Persistent wheezing and dyspnea (tachypnea).
PEF 50–79% predicted or personal best.
- Add oral systemic corticosteroid.
- Continue inhaled SABA.
- Contact clinician urgently (this day) for further instruction.

Poor Response

Marked wheezing and dyspnea. PEF <50% predicted or personal best.
- Add oral systemic corticosteroid.
- Repeat inhaled SABA immediately.
- If distress is severe and nonresponsive to initial treatment:
  - Call your doctor AND
  - PROCEED TO ED;
  - Consider calling 9–1–1 (ambulance transport).
- To ED.
What the EPR -3 Does **NOT** Recommend

- Drinking large volumes of liquids or breathing warm, moist air *(e.g., the mist from a hot shower)*
- Using over-the-counter products such as antihistamines or cold remedies
- Although pursed-lip and other forms of controlled breathing may help to maintain calm during respiratory distress, these methods do *not* bring about improvement in lung function
Many Thanks To -

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Asthma Program

www.health.state.mn.us/asthma