Diagnosis and Management of Asthma in American Indian Youth

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Objectives

• Describe the pathophysiology of asthma
• Explain the diagnosis criteria for asthma in Native youth
• Apply diagnostic criteria for obstructive lung disease based on PFT results
• Create a personalized asthma action plan based on peak flow readings
• Recommend the most appropriate medication regimen by utilizing the guideline tables for assessing control and severity of asthma
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• Advanced Practice Pharmacist II
• Northern Navajo Medical Center
• Completed PGY-1 Residency at NNMC (Class of 2008)
• New Mexico Pharmacist Clinician
• Coordinator Adult Asthma Clinic and Chronic Disease Management Clinic
• Pharmacist Provider in NNMC Epilepsy Clinic
• NCPS (asthma, epilepsy)
Pathophysiology and Diagnosis

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What defines asthma?

• Global Initiative for Asthma 2014 (GINA)
  – “Asthma is a heterogeneous disease, usually characterized by chronic airway inflammation. It is defined by the history of respiratory symptoms such as wheeze, shortness of breath, chest tightness, and cough that vary over time and in intensity, together with variable expiratory flow limitations”

• Expert Panel Report 3, 2007 Guidelines
  – “Asthma is a chronic inflammatory disorder of the airways in which many cells and cellular elements play a role…. In susceptible individuals this inflammation causes recurrent episodes of coughing, wheezing, breathlessness and chest tightness. These episodes are usually associated with widespread but variable airflow obstruction...”
Inflammation Leads to the Following:

- **Bronchoconstriction**
  - Bronchial smooth muscle constriction that quickly narrows airways in response to various stimuli

- **Airway Hyper responsiveness**
  - An exaggerated bronchoconstriction to a stimuli

- **Airway Edema**
  - Edema, mucus hypersecretion, and mucus plug formation

- **Remodeling**
  - Occurs over time and will reduce reversibility of disease
Diagnosis Criteria

• Nothing specific for Native American youth
• There is no one diagnostic test for asthma in any age group
• Diagnosis is based on a thorough patient history and should include an assessment of risk factors
• Physical examination and pulmonary function tests (PFT) may be normal
Diagnosis of Asthma – Patient History

• History of coughing, shortness of breath, wheezing
  – Recurrent and vary in intensity
  – Often occur at night or early morning
• Symptoms triggered by allergens or irritants
  – Smoke
  – Viral infections
  – Allergies
  – Cold air or weather changes
  – Emotions
  – Exercise
• Risk factors
Asthma Risk Factors

- Parent or sibling with asthma
- Having another allergic conditions (atopic dermatitis or allergic rhinitis)
- Overweight/obese
- Smoker
- Exposure to secondhand smoke
- Having a mother that smoked during pregnancy
- Exposure to exhaust fumes or other pollution
- Exposure to occupational triggers such as chemicals used in farming, hairdressing, and manufacturing
- Boys>girls; women>men
- Respiratory infections in childhood may also contribute
Spirometry

LCDR Kevin McDermott
When to Perform

• At initial diagnosis
• After symptoms stabilized
• During periods of prolonged or progressive loss of asthma control
• At least every 1-2 years; more frequently if needed
Who Should Not Be Tested

• One month since myocardial infarctions (contraindication)
• Chest or abdominal pain of any cause
• Oral/facial pain exacerbated by mouthpiece
• Stress incontinence
• Dementia or confused state
Do’s and Don’ts Before Procedure

- Do not use albuterol or anticholenergic w/in four hours of test
- Do not use long acting beta-agonists within 12 hours of test
- Do not take aminophylline within 12 hours of test
- Do not smoke within 1 hour of test
- Avoid caffeine products day of test
- May take inhaled or systemic steroids
Terminology

- **FEV1**: Forced expiratory volume in 1 second after maximal inspiration
- **FVC**: Forced vital capacity – maximum air that can be forcibly exhaled after maximal inspiration
## Change in Spirometry Values

<table>
<thead>
<tr>
<th>Measurement</th>
<th>Obstruction</th>
<th>Restriction</th>
</tr>
</thead>
<tbody>
<tr>
<td>FVC</td>
<td>Normal or decreased</td>
<td>Decreased</td>
</tr>
<tr>
<td>FEV1</td>
<td>Decreased</td>
<td>Decreased or normal</td>
</tr>
<tr>
<td>FEV1/FVC</td>
<td>Decreased</td>
<td>Normal</td>
</tr>
</tbody>
</table>
Reversibility Criteria

- FEV1 change after bronchodilator
  - Increase by 12%
  - Increase by 200ml

Normal Values

• There are no “normal” values
• Different data sets and guidelines
  – At least 84 data sets from 68 different authors (NHANES, Crapo, Hsu, etc)
  – Multiple guidelines for interpretation (GOLD, ATS/ERS, etc)
• Values depend on age, height, weight, and sex
• “Normal” values will decrease with age
• Predicted normal values will vary with study data/equations used
Interpretation Guidelines

• ATS/ERS 2005
  – Uses 5th percentile as lower limit of normal (LLN) for all spirometry values
  – 5th percentile is becoming the Gold Standard

• Gold Guidelines
  – Uses fixed ratio of 0.7 for FEV1/FVC and 0.8 for rest of testing values
  – Pros – easy to use and doesn’t require complicated calculation
  – Cons – can lead to inappropriate diagnosis in old/young patients

• Pearl – most spirometry machines comes with pre-programmed software to calculate results of test
Pellegrino R, et al. Standardisation of lung function testing. ATS/ERS 2005
Creating a Personalized Asthma Action Plan

LCDR Tana Triepke
Tana Triepke, Pharm.D., cTTS, AE-C, NCPS
LCDR, USPHS

• Advanced Practice Pharmacist II
• Spirit Lake Health Center, Fort Totten, North Dakota
• Certified Tobacco Treatment Specialist; implemented Tobacco Cessation Clinic at Spirit Lake in 2008.
• NIOSH certification in spirometry and implementation of spirometry services at Spirit Lake in 2012.
• Certified Asthma Educator; implemented Adult Asthma Clinic at Spirit Lake in 2012.
• Anticoagulation and immunization provider.
Asthma Action Plan

• A tool for asthma self management that includes instructions for:
  – Daily management
    • What medicine to take daily, including the specific names of the medications
    • What actions to take to control environmental factors that worsen the patient’s asthma
  – How to recognize and handle worsening asthma
    • What signs, symptoms, and PEF measurements (if peak flow monitoring is used) indicate worsening asthma
    • What medications to take in response to these signs
    • What symptoms and PEF measurements indicate the need for urgent medical attention
    • Emergency telephone numbers for the physician, ED, and person or service to transport the patient rapidly for medical care
**Asthma Action Plans**

### Child Asthma Action Plan

**0–3 years of age**

**Patient Name:**

**Medical Record #:**

**Health Care Provider's Name:**

**Health Care Provider's Phone #:**

<table>
<thead>
<tr>
<th>Long-Term Control Medicines (One Every Day to Stay Healthy)</th>
<th>How Much To Take</th>
<th>How Often</th>
<th>Other Instructions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PREVENT asthma symptoms every day:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Give the above long-term control medicines every day.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Avoid things that make the child's asthma worse:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Avoid tobacco smoke, ask people to smoke outside.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>CAUTION:</strong> Take action by continuing to give regular asthma medicines every day and:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Give:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>YELLOW ZONE:</strong> Child is not well and has asthma symptoms that may include:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Coughing</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Wheezing</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Fatty or other cold symptoms</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Breathing harder or faster</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Awakened due to coughing or difficulty breathing</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Sleeping less than usual</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Other symptoms that could indicate that your child has been having trouble breathing may include:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Difficulty feeding, gaping, sounds, poor sucking, changes in sleep patterns, cradle and listed decreased appetite.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>GREEN ZONE:</strong> Child is well and has no asthma symptoms, even during active play.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Take the child to a hospital for asthma treatment.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**RED ZONE:** Child feels awful. Warning signs may include:

• Cough, wheezes, or difficulty breathing contains or worsens, even after giving yellow zone medicines.

• Child's breathing sounds so hard that the child is having trouble breathing.

• Child is dizzy or less alert than normal.

**MEDICAL ALERT! Get help:**

• Call 911 if:
  • The child's skin is cool around neck and ribs, or
  • Lips and/or fingernails are gray or blue, or
  • Child doesn't respond to you.

**PREVENT asthma symptoms every day:**

• Take the above long-term control medicines every day.

• Avoid things that make the child's asthma worse:
  • Avoid tobacco smoke, ask people to smoke outside.

**CAUTION:** Take action by continuing to give regular asthma medicines every day.

• Give:

**GREEN ZONE:** Child is well and has no asthma symptoms, even during active play.

**YELLOW ZONE:** Child is not well and has asthma symptoms that may include:

• Coughing
• Wheezing
• Fatty or other cold symptoms
• Breathing harder or faster
• Awakened due to coughing or difficulty breathing
• Sleeping less than usual

**CAUTION:** Take action by continuing to give regular asthma medicines every day.

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• Coughing
• Wheezing
• Fatty or other cold symptoms
• Breathing harder or faster
• Awakened due to coughing or difficulty breathing
• Sleeping less than usual

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**PREVENT asthma symptoms every day:**

• Take the above long-term control medicines every day.

• Avoid things that make the child's asthma worse:
  • Avoid tobacco smoke, ask people to smoke outside.

**CAUTION:** Take action by continuing to give regular asthma medicines every day.

• Give:
Why utilize asthma action plans?

• The Expert Panel found that optimal self-management, including self-monitoring of symptoms and/or peak flow and a written asthma action plan, significantly reduced hospitalizations and ED visits for asthma.

• The Expert Panel recommends that asthma self-management education be incorporated into routine care for children who have asthma (Evidence A).

• Goal
  – Reduce impairment
  – Reduce risk
Who should be utilizing asthma action plans?

• Provide to all patients a written asthma action plan that includes daily treatment and recognizing and handling worsening asthma, including self-adjustment of medications in response to acute symptoms or changes in PEF measures.

• Written action plans are particularly recommended for patients who have moderate or severe persistent asthma, a history of severe exacerbations, or poorly controlled asthma (Evidence B).
To Peak Flow or to Not Peak Flow

• Whether peak flow monitoring, symptom monitoring, or a combination of approaches is used, self-monitoring is important to the effective self-management of asthma (Evidence A).

• Either peak flow monitoring or symptom monitoring, if taught and followed correctly, may be equally effective (Evidence B).
Guidance on When to Use Peak Flow Monitoring

• At the discretion of the patient and provider
• To evaluate responses to treatment
• To evaluate environmental/occupational exposures
• Provide guidance for patients who have poor perception of airflow obstruction

➢ Peak flow monitoring for self-management of asthma may be less effective for children but can be used in ages ≥5 years old.
How to Use a Peak Flow Meter

1. Move the indicator to the bottom of the numbered scale.
2. Stand up.
3. Take a deep breath, filling your lungs completely.
4. Place the mouthpiece in your mouth and close your lips around it. Do not put your tongue inside the hole.
5. Blow out as hard and fast as you can in a single blow.
Find Your Personal Best Peak Flow Number

• Personal best peak flow is the highest peak flow number you can achieve over a 2-week period when your asthma is under good control.
  – At least twice a day for 2 to 3 weeks.
  – When you wake up and in late afternoon or early evening.
  – 15–20 minutes after you take your inhaled short-acting beta2-agonist for quick relief.
Setting Up Peak Flow Zones

• **Green Zone** (more than __L/min [80 percent of your personal best number]) signals good control.

• **Yellow Zone** (between __L/min and __L/min [50 to less than 80 percent of your personal best number]) signals caution.

• **Red Zone** (below __L/min [less than 50 percent of your personal best number]) signals a medical alert.
Actions With Peak Flows

• If peak flow is in yellow zone: take inhaled short-acting beta2-agonist (quick-relief medicine) as prescribed

• If peak flow increases by 20% or more before and after taking inhaled short-acting beta2-agonist (quick-relief medicine) speak with provider about starting additional controller medication.
Case Study

• Demo Child is a 9yo boy presenting to the clinic with his peak flow results. It was determined that 300 was his personal best peak flow. His current asthma medications are: flovent 110mcg/puff 1 puff bid; singulair 5mg qpm; albuterol 2 puffs q46h prn.

• Determine his peak flow zones and create a personalized asthma action plan for him

• http://www.rampasthma.org/
Case Study

1. Green zone: >250L/min; Yellow zone 150-250L/min; Red zone <150

2. Green zone: >300L/min; Yellow zone 150-250L/min; Red zone <150

3. Green zone: >240L/min; Yellow zone 150-240L/min; Red Zone <150

4. Green zone: >240L/min; Yellow zone 120-240L/min; Red Zone <120
## My Asthma Plan

### ENGLISH

**Patient Name:** Demo, Child  
**Medical Record #:** 33333  
**DOB:** 01-01-2006

**Provider’s Name:** Dr. Asthmacontrol  
**Provider’s Phone #:** 666-666-6666  
**Completed by:** TNT  
**Date:** 01-30-2015

### Controller Medicines

<table>
<thead>
<tr>
<th>Medicine</th>
<th>How Much to Take</th>
<th>How Often</th>
<th>Other Instructions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flovent HFA 110</td>
<td>1 puff</td>
<td>2 times per day</td>
<td>Gargle or rinse mouth after use</td>
</tr>
<tr>
<td>Singulair 5mg</td>
<td>1 tab</td>
<td>1 times per day</td>
<td>Take in the evening</td>
</tr>
</tbody>
</table>

### Quick-Relief Medicines

<table>
<thead>
<tr>
<th>Medicine</th>
<th>How Much to Take</th>
<th>How Often</th>
<th>Other Instructions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Albuterol – Proventil</td>
<td>2 puffs</td>
<td>Take ONLY as needed (see below — starting in Yellow Zone or before excercise)</td>
<td>NOTE: If you need this medicine more than two days a week, call physician to consider increasing controller medications and discuss your treatment plan.</td>
</tr>
</tbody>
</table>
Special instructions when I am doing well, getting worse, having a medical alert.

**Doing well.**
- No cough, wheeze, chest tightness, or shortness of breath during the day or night.
- Can do usual activities.

**Peak Flow** (for ages 5 and up): 240 or more. (80% or more of personal best)

**Personal Best Peak Flow** (for ages 5 and up): 300

**PREVENT asthma symptoms every day:**
- Take my controller medicines (above) every day.
- Before exercise, take 2 puff(s) of albuterol.
- Avoid things that make my asthma worse.
  (See back of form.)

**Getting worse.**
- Cough, wheeze, chest tightness, shortness of breath, or
- Waking at night due to asthma symptoms, or
- Can do some, but not all, usual activities.

**Peak Flow** (for ages 5 and up): 150 to 239 (50 to 79% of personal best)

**CAUTION.** Continue taking every day controller medicines, AND:
- Take 2 puffs or 1 nebulizer treatment of quick relief medicine.
- If I am not back in the Green Zone within 20-30 minutes take 2 more puffs or nebulizer treatments. If I am not back in the Green Zone within one hour, then I should:
  - Increase ____________
  - Add Prednisone 5mg twice daily for 5 days
  - Call 666-666-6666
  - Continue using quick relief medicine every 4 hours as needed. Call provider if not improving in 2 days.
Special instructions for different zones example for green and yellow

Medical Alert

- Very short of breath, or
- Quick-relief medicines have not helped, or
- Cannot do usual activities, or
- Symptoms are same or get worse after 24 hours in Yellow Zone.

Peak Flow (for ages 5 and up):
less than 150 (50% of personal best)

MEDICAL ALERT! Get help!

- Take quick relief medicine: 2 puffs every 20 minutes and get help immediately.
- Take **prednisone 5mg now and**
- Call 911

Danger! Get help immediately! Call 911 if trouble walking or talking due to shortness of breath or if lips or fingernails are gray or blue. For child, call 911 if skin is sucked in around neck and ribs during breaths or child doesn’t respond normally.

Health Care Provider: My signature provides authorization for the above written orders. I understand that all procedures will be implemented in accordance with state laws and regulations. Student may self carry asthma medications: □ Yes □ No self administer asthma medications: □ Yes □ No

This authorization is for a maximum of one year from signature date.

__________________________
Healthcare Provider Signature

__________________________
Date
Stepwise Approach to Asthma Treatment

LCDR James Garrett Sims, PharmD, BCPS, NCPS
James Garrett Sims, PharmD, BCPS, NCPS  
LCDR, USPHS

• Advanced Practice Pharmacist I
• Northern Navajo Medical Center
• Completed PGY-1 Residency at NNMC (Class of 2010)
• Coordinator for NNMC Epilepsy Clinic.
• Pharmacist Provider in NNMC Asthma Clinic
• NCPS (Epilepsy)
Guidelines in General

• Three Different Age Categories
  – 0-4 years old
  – 5-11 years old
  – 12 years old and older
• Symptom and Lung Function guided
• Classification
  – Initial step for treatment
• Control
  – Step up or down
Symptoms

• Daytime symptoms
• Nighttime awakenings
• Use of short acting B-agonist
• Interference with normal activity
Classification Example Case

• 13 yo M pt was seen last week in the ER with trouble breathing. He was diagnosed with asthma exacerbation. He has no prior diagnosis of asthma. He was prescribed an albuterol inhaler and a prednisone burst. Upon follow up at your clinic he admits to the following symptoms
  – <2 days out of the week of day time symptoms
  – Wakes up nightly with trouble breathing
  – Uses albuterol once each night
  – Minor limitations
  – Lung function tests not currently available
  – One prednisone burst
How would his asthma severity be classified?

<table>
<thead>
<tr>
<th>Components of Severity</th>
<th>Classification of Asthma Severity</th>
<th>&gt;12 years of age</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Intermittent</td>
<td>Persistent</td>
</tr>
<tr>
<td></td>
<td>Mild</td>
<td>Moderate</td>
</tr>
<tr>
<td>Symptoms</td>
<td>&lt;2 days/week</td>
<td>&gt;2 days/week but not daily</td>
</tr>
<tr>
<td>Nighttime awakenings</td>
<td>&lt;2x/month</td>
<td>3-4x/month</td>
</tr>
<tr>
<td>Short-acting beta-agonist use for symptom control (not prevention of EIB)</td>
<td>&lt;2 days/week</td>
<td>&gt;2 days/week but not daily, and not more than 1x on any day</td>
</tr>
<tr>
<td>Interference with normal activity</td>
<td>None</td>
<td>Minor limitation</td>
</tr>
<tr>
<td>Lung function</td>
<td>Normal FEV₁ between exacerbations</td>
<td>FEV₁ &gt;80% predicted</td>
</tr>
<tr>
<td></td>
<td>FEV₁/FVC normal</td>
<td>FEV₁/FVC reduced 5%</td>
</tr>
<tr>
<td>Risk</td>
<td>Exacerbations requiring oral systemic corticosteroids</td>
<td>0-1/year (see note)</td>
</tr>
</tbody>
</table>

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 FEV₁.
Which step should this pt be started on?

<table>
<thead>
<tr>
<th>Components of Severity</th>
<th>Classification of Asthma Severity ≥12 years of age</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Persistent</td>
</tr>
<tr>
<td></td>
<td>Intermittent</td>
</tr>
<tr>
<td>Recommended Step for Initiating Treatment</td>
<td>Step 1</td>
</tr>
</tbody>
</table>

(See figure 4–5 for treatment steps.)

In 2–6 weeks, evaluate level of asthma control that is achieved and adjust therapy accordingly.
### Classification of Asthma Severity

#### ≥12 years of age

<table>
<thead>
<tr>
<th>Components of Severity</th>
<th>Intermittent</th>
<th>Persistent</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Symptoms</strong></td>
<td>≤2 days/week</td>
<td>&gt;2 days/week but not daily</td>
</tr>
<tr>
<td><strong>Nighttime awakenings</strong></td>
<td>≤2x/month</td>
<td>3–4x/month</td>
</tr>
<tr>
<td><strong>Short-acting β₂-agonist use for symptom control (not prevention of EIB)</strong></td>
<td>≤2 days/week</td>
<td>&gt;2 days/week but not daily, and not more than 1x on any day</td>
</tr>
<tr>
<td><strong>Interference with normal activity</strong></td>
<td>None</td>
<td>Minor limitation</td>
</tr>
</tbody>
</table>

#### Impairment

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

#### Lung function

- Normal FEV₁ between exacerbations
- FEV₁ >80% predicted
- FEV₁/FVC normal

- FEV₁ >80% predicted
- FEV₁/FVC normal
- FEV₁ >60% but <80% predicted
- FEV₁/FVC reduced 5%
- FEV₁/FVC reduced >5%

#### Risk

- 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 FEV₁.

#### Recommended Step for Initiating Treatment

1. **Step 1**
   - In 2–6 weeks, evaluate level of asthma control that is achieved and adjust therapy accordingly.

2. **Step 2**

3. **Step 3**
   - and consider short course of oral systemic corticosteroids

4. **Step 4 or 5**

(See figure 4–5 for treatment steps.)

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2015 IHS NCC Winter Meeting  44
Steps of Asthma Care by severity

Step 1
Preferred: SABA PRN

Step 2
Preferred: Low-dose ICS
Alternative: Cromolyn, LTRA, Nedocromil, or Theophylline

Step 3
Preferred: Medium-dose ICS + LABA
Alternative: Medium-dose ICS + either LTRA, Theophylline, or XIeuton

Step 4
Preferred: High-dose ICS + LABA
AND
Consider Omalizumab for patients who have allergies

Step 5
Preferred: High-dose ICS + LABA
AND
Consider Omalizumab for patients who have allergies

Step 6
Preferred: High-dose ICS + LABA or oral corticosteroid
(First, check adherence, environmental control, and comorbid conditions)

Assess control
Step down if possible
(and asthma is well controlled at least 3 months)

Quick-Relief Medication for All Patients
- SABA as needed for symptoms. Intensity of treatment depends on severity of symptoms: up to 3 treatments at 20-minute intervals as needed. Short course of oral systemic corticosteroids may be needed.
- Use of SABA >2 days a week for symptom relief (not prevention of EIB) generally indicates inadequate control and the need to step up treatment.

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

Each step: Patient education, environmental control, and management of comorbidities.
Steps 2–4: Consider subcutaneous allergen immunotherapy for patients who have allergic asthma (see notes).
Assessing Control Example Case

• Same pt came back to your clinic for his two week follow up appointment. At last visit he was started on Dulera 100/5 ii puffs BID.

• His symptoms are as follows
  – <2 days of the week with day time symptoms.
  – 2 night time awakenings.
  – No interference with his normal activities.
  – Uses his albuterol once per week.
  – FEV1 85% of personal best.
How would his control be classified?

<table>
<thead>
<tr>
<th>Components of Control</th>
<th>Classification of Asthma Control (≥12 years of age)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></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;60% predicted/ personal best</td>
</tr>
</tbody>
</table>

How should you change his treatment?

**Recommended Action for Treatment**

- Maintain current step.
- Regular followups every 1–6 months to maintain control.
- Consider step down if well controlled for at least 3 months.
- Step up 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.
FIGURE 4-5. STEPWISE APPROACH FOR MANAGING ASTHMA IN YOUTHS ≥12 YEARS OF AGE AND ADULTS

Step 1
Preferred: SABA PRN

Step 2
Preferred: Low-dose ICS
Alternative: Cromolyn, LTRA, Nedocromil, or Theophylline

Step 3
Preferred: High-dose ICS + LABA
Alternative: Medium-dose ICS + LABA

Step 4
Preferred: High-dose ICS + LABA + oral corticosteroid
Consider Omalizumab for patients who have allergies

Step 5
Preferred: Medium-dose ICS + either LTRA, Theophylline, or Zileuton
Consider Omalizumab for patients who have allergies

Step 6
Preferred: High-dose ICS + LABA + oral corticosteroid
And
Consider Omalizumab for patients who have allergies

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)

Each step: Patient education, environmental control, and management of comorbidities.
Steps 2–4: Consider subcutaneous allergen immunotherapy for patients who have allergic asthma (see notes).

Quick-Relief Medication for All Patients
- SABA as needed for symptoms. Intensity of treatment depends on severity of symptoms: up to 3 treatments at 20-minute intervals as needed. Short course of oral systemic corticosteroids may be needed.
- Use of SABA >2 days a week for symptom relief (not prevention of EIB) generally indicates inadequate control and the need to step up treatment.
Differences in Age Groups

- No lung function assessment in 0-4 age group.
  - Classification and control.
- Less treatment options in 0-4 age group.
- Medium Dose ICS preferred step 3 in initial therapy for 0-4 and 5-11 age groups.
- Starting step for severe persistent asthma is Step 3 medium dose ICS or Step 4.
Common Pitfalls

• Problem lists may be misleading.
  – Medications also guide

• Step 1 treatment is prn albuterol not low dose ICS.

• Don’t assume technique and/or refill history is perfect.

• High dose ICS is not on the stepwise guidelines.

• Make sure you are using the correct guidelines for the patients age.
Figures from Guidelines for Reference.
### Classifying Asthma Severity and Initiating Treatment in Children 0–4 Years of Age

Assessing severity and initiating therapy in children who are not currently taking long-term control medication.

<table>
<thead>
<tr>
<th>Components of Severity</th>
<th>Classification of Asthma Severity (0–4 years of age)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Intermittent</td>
</tr>
<tr>
<td></td>
<td>Mild</td>
</tr>
<tr>
<td>Impairment</td>
<td></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-agonist use for symptom control (not prevention of EIB)</td>
<td>≤2 days/week</td>
</tr>
<tr>
<td>Interference with normal activity</td>
<td>None</td>
</tr>
<tr>
<td>Risk</td>
<td>Exacerbations requiring oral systemic corticosteroids</td>
</tr>
<tr>
<td></td>
<td>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.</td>
</tr>
</tbody>
</table>

**Recommended Step for Initiating Therapy**

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

- Step 1
- Step 2
- Step 3 and consider short course of oral systemic corticosteroids

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.
### FIGURE 4–2b. CLASSIFYING ASTHMA SEVERITY AND INITIATING TREATMENT IN CHILDREN 5–11 YEARS OF AGE

Assessing severity and initiating therapy in children who are not currently taking long-term control medication.

<table>
<thead>
<tr>
<th>Components of Severity</th>
<th>Classification of Asthma Severity (5–11 years of age)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Intermittent</td>
</tr>
<tr>
<td>Symptoms</td>
<td>≤2 days/week</td>
</tr>
<tr>
<td>Nighttime awakenings</td>
<td>≤2x/month</td>
</tr>
<tr>
<td>Short-acting beta-agonist use for symptom control (not prevention of EIB)</td>
<td>≤2 days/week</td>
</tr>
<tr>
<td>Interference with normal activity</td>
<td>None</td>
</tr>
<tr>
<td>Lung function</td>
<td>• Normal FEV₁ between exacerbations</td>
</tr>
<tr>
<td></td>
<td>• FEV₁/FVC &gt;85%</td>
</tr>
</tbody>
</table>

### Risk

<table>
<thead>
<tr>
<th>Exacerbations requiring oral systemic corticosteroids</th>
</tr>
</thead>
<tbody>
<tr>
<td>0–1/year (see note)</td>
</tr>
</tbody>
</table>

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 FEV₁.

### Recommended Step for Initiating Therapy

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

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

In 2–6 weeks, evaluate level of asthma control that is achieved, and adjust therapy accordingly.
**Figure 4-6. Classifying Asthma Severity and Initiating Treatment in Youths ≥12 Years of Age and Adults**

Assessing severity and initiating treatment for patients who are not currently taking long-term control medications.

<table>
<thead>
<tr>
<th>Components of Severity</th>
<th>Classification of Asthma Severity ≥12 years of age</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Persistent</td>
</tr>
<tr>
<td></td>
<td>Intermittent</td>
</tr>
<tr>
<td>Symptoms</td>
<td>&lt;2 days/week</td>
</tr>
<tr>
<td>Nighttime awakenings</td>
<td>&lt;2x/month</td>
</tr>
<tr>
<td>Short-acting beta2-agonist use for symptom control (not prevention of EIB)</td>
<td>&lt;2 days/week</td>
</tr>
<tr>
<td>Interference with normal activity</td>
<td>None</td>
</tr>
</tbody>
</table>

**Impairment**

- Normal FEV1/FVC:
  - 8–19 yr 85%
  - 20–39 yr 80%
  - 40–59 yr 75%
  - 60–80 yr 70%

**Lung Function**

- FEV1 >80% predicted
- FEV1/FVC normal

**Exacerbations requiring oral systemic corticosteroids**

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

**Risk**

- 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 FEV1.

**Recommended Step for Initiating Treatment**

(See figure 4-5 for treatment steps.)

- Step 1
- Step 2
- Step 3 and consider short course of oral systemic corticosteroids
- Step 4 or 5

In 2-6 weeks, evaluate level of asthma control that is achieved and adjust therapy accordingly.
### Assessing Asthma Control and Adjusting Therapy in Children 0–4 Years of Age

<table>
<thead>
<tr>
<th>Components of Control</th>
<th>Classification of Asthma Control (0–4 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>≤1x/month</td>
</tr>
<tr>
<td>Interference with normal activity</td>
<td>None</td>
</tr>
<tr>
<td>Short-acting beta-agonist use for symptom control (not prevention of EIB)</td>
<td>≤2 days/week</td>
</tr>
</tbody>
</table>

#### Impairment

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

#### 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.
**TABLE 4–3b. ASSESSING ASTHMA CONTROL AND ADJUSTING THERAPY IN 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></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,-agonist use for symptom control (not prevention of EIB)</td>
<td>&lt;60% predicted/ personal best</td>
</tr>
<tr>
<td>Lung function</td>
<td>&gt;80% predicted/ personal best</td>
</tr>
<tr>
<td>• FEV₁ or peak flow</td>
<td>&gt;80%</td>
</tr>
<tr>
<td>• FEV₁/FVC</td>
<td></td>
</tr>
<tr>
<td>Exacerbations requiring oral systemic corticosteroids</td>
<td>0–1/year</td>
</tr>
<tr>
<td>Risk</td>
<td>Reduction in lung growth</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.
**Figure 4-7. Assessing Asthma Control and Adjusting Therapy in Youths ≥12 Years of Age and Adults**

<table>
<thead>
<tr>
<th>Components of Control</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 ≤0.75ᵃ</td>
</tr>
<tr>
<td>ACQ</td>
<td>≤0.20</td>
</tr>
<tr>
<td>ACT</td>
<td>≥0.20</td>
</tr>
<tr>
<td>Exacerbations requiring oral systemic corticosteroids</td>
<td>0–1/year</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>

**Recommended Action for Treatment**

(see figure 4–5 for treatment steps)

- Maintain current step.  
- Regular followups every 1–6 months to maintain control.  
- Consider step down if well controlled for at least 3 months.

- Step up 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.
Figure 4-1a. Stepwise Approach for Managing Asthma in Children 0–4 Years of Age

Step 1
Preferred: SABA PRN
Alternative: Cromolyn or Montelukast

Step 2
Preferred: Medium-dose ICS

Step 3
Preferred: High-dose ICS + either LABA or Montelukast

Step 4
Preferred: Oral systemic corticosteroids

Step 5
Preferred: High-dose ICS + either LABA or Montelukast

Step 6
Step up if needed (first, check adherence, inhaler technique, and environmental control)

Assess control
Step down if possible (and asthma is well controlled at least 3 months)

Patient Education and Environmental Control at Each Step

- Quick-Relief Medication for All Patients
  - SABA as needed for symptoms. Intensity of treatment depends on severity of symptoms.
  - With viral respiratory infection: SABA q 4-6 hours up to 24 hours (longer with physician consult). Consider short course of oral systemic corticosteroids if exacerbation is severe or patient has history of previous severe exacerbations.
  - Caution: Frequent use of SABA may indicate the need to step up treatment. See text for recommendations on initiating daily long-term-control therapy.
FIGURE 4–1b. STEPWISE APPROACH FOR MANAGING ASTHMA IN CHILDREN 5–11 YEARS OF AGE

Step 1
Preferred: SABA PRN
Alternative: Cromolyn, LTRA, Nedocromil, or Theophylline

Step 2
Preferred: Low-dose ICS
Alternative: Either: Low-dose ICS + either LABA, LTRA, or Theophylline
OR Medium-dose ICS

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

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

Step 5
Preferred: High-dose ICS + LABA + oral systemic corticosteroid
Alternative: High-dose ICS + either LTRA or Theophylline + oral systemic corticosteroid

Step 6
Preferred: High-dose ICS + LABA + oral systemic corticosteroid
Alternative: High-dose ICS + either LTRA or Theophylline + oral systemic corticosteroid

Assess control

Step up if needed
(first, check adherence, inhaler technique, environmental control, and comorbidity conditions)

Step down if possible
(and asthma is well controlled at least 3 months)

Each step: Patient education, environmental control, and management of comorbidities.
Steps 2–4: Consider subcutaneous allergen immunotherapy for patients who have allergic asthma (see notes).

Quick-Relief Medication for All Patients
- SABA as needed for symptoms. Intensity of treatment depends on severity of symptoms: up to 3 treatments at 20-minute intervals as needed. Short course of oral systemic corticosteroids may be needed.
- Caution: Increasing use of SABA or use >2 days a week for symptom relief (not prevention of EIB) generally indicates inadequate control and the need to step up treatment.
Stepwise Approach for Managing Asthma in Youths ≥12 Years of Age and Adults

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

2. **Step 2**
   - **Preferred:** Low-dose ICS + LABA
   - **Alternative:** Medium-dose ICS

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

4. **Step 4**
   - **Preferred:** High-dose ICS + LABA AND
   - **Consider:** Omalizumab for patients who have allergies

5. **Step 5**
   - **Preferred:** High-dose ICS + LABA AND
   - **Consider:** Omalizumab for patients who have allergies

6. **Step 6**
   - **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)

**Intertemt Asthma**
- Consult with asthma specialist if step 4 care or higher is required.
- Consider consultation at step 3.

**Quick-Relief Medication for All Patients**
- SABA as needed for symptoms. Intensity of treatment depends on severity of symptoms: up to 3 treatments at 20-minute intervals as needed. Short course of oral systemic corticosteroids may be needed.
- Use of SABA >2 days a week for symptom relief (not prevention of EIB) generally indicates inadequate control and the need to step up treatment.
References


• Asthma’s Impact on the Nation: Data from the CDC National Asthma Control Program. [cited Dec 2014]. Available at: http://www.cdc.gov/asthma/impacts_nation/asthmafactsheet.pdf


