Asthma Education

Michael A Kaliner, MD
Medical Director, Institute for Asthma and Allergy
Wheaton and Chevy Chase, MD, USA
Asthma 101

• Initial assessment of patient
• Establishment of goals
• Establishment of a partnership
How Should We Manage Asthma Patients?

- Accurately assess extent of asthma
- Establish contract with patients
  - Set realistic expectations
  - Set lifelong goals
- Spend time with patients
  - Relatively small investment of time can dramatically improve compliance and outcomes
- Monitor patients regularly
Initial History

- Do you wheeze?
- Shortness of breath?
- Tightness in the chest?
- Exercise? Do you get more SOB than you should?
- Cough? Throat vs. chest, sputum quality/quantity?
- Use of bronchodilator?
- Nocturnal awakenings?
- Peak flow meter use; average, best, worst reading?
- ER visits, hospitalizations?
- Days missed from work or activities?
Tools for assessment and management

- Spirometry
- Skin testing for allergies
- Teaching correct use of inhalers and spacers
- Provide peak flow meters and demonstrate use
- Provide brochures/leaflets on asthma
- Question patient regarding
  - Use of controller inhaler
  - Side effects of medication
  - Allergy avoidance techniques
Diagnostic tests for airflow obstruction, reversibility and variability

• Pulmonary function:
  – Reduced \( \text{FEV}_1 \) and \( \text{FEV}_1\% \)
  – Pre- and post-bronchodilator treatment (+10-12% improvement in \( \text{FEV}_1 \))
    • Spirometry
    • Peak flow meter
    • Exercise, inhalation or mannitol challenges
  – AM versus PM peak expiratory flows (PEF)
  – Trial of corticosteroids, inhaled or oral:
    • Improvement in PEF or \( \text{FEV}_1 \)
Key Goals in Patient Education

- With the help of the health-care team, patients can learn to do the following:
  - Avoid risk factors
  - Take medications correctly
  - Understand the difference between “controller” and “reliever” medications
  - Monitor status using symptoms or peak expiratory flow
  - Recognize signs that asthma is worsening and take action

Asthma 102: Mechanisms of airflow obstruction

Airflow obstruction in asthma is caused by:

- Bronchial smooth muscle contraction
- Airway wall edema
- Airway wall vascular dilation
- Increased airway luminal fluid:
  - Mucus secretion
  - Increased vascular permeability
- Airway wall inflammation
Symptoms of asthma

• **Cardinal symptoms** of asthma:
  – Wheeze
  – Shortness of breath, dyspnea
  – Chest tightness
  – Cough and mucus secretion
  – Exercise intolerance

• **Reversible airflow obstruction** is the primary underlying pathological event
Airway Morphology in Asthma

- Goblet cell hyperplasia
- Increased permeability/microvascular leakage
- Mucus
- Collagen deposition
- Epithelial damage
- Increased smooth muscle mass
- Inflammatory cell infiltration
- Angiogenesis

Why asthma makes it hard to breathe

Air enters the respiratory system from the nose and mouth and travels through the bronchial tubes.

In an asthmatic person, the muscles of the bronchial tubes tighten and thicken, and the air passages become inflamed and mucus-filled, making it difficult for air to move.

In a non-asthmatic person, the muscles around the bronchial tubes are relaxed and the tissue thin, allowing for easy airflow.

Inflamed bronchial tube of an asthmatic

Normal bronchial tube
Asthma 103

Severity and Control

**Severity:**
The pre-treatment intensity of disease

**Control:**
The intensity of the disease while on treatment; how close treatment gets patient to “goal”
<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Severity</td>
<td>Intermittent or persistent? If persistent: Mild Moderate Severe</td>
</tr>
<tr>
<td></td>
<td>Useful only at the initial visit before prescribing controller therapy.</td>
</tr>
<tr>
<td></td>
<td>All subsequent visits focus on assessment of asthma control.</td>
</tr>
<tr>
<td>Control</td>
<td>Well-controlled Not well-controlled Very poorly controlled</td>
</tr>
<tr>
<td></td>
<td>Impairment assessment at every subsequent visit to determine response to</td>
</tr>
<tr>
<td></td>
<td>therapy and need to step up or step down treatment. Common goal is to</td>
</tr>
<tr>
<td></td>
<td>control asthma using the lowest effective medication dose.</td>
</tr>
</tbody>
</table>
Severity: Pre-Treatment Assessment

SEVERITY
Underlying Intensity of Disease
Pre-Treatment

Impairment
- Frequency of symptoms
- Intensity of symptoms
- Measures of lung function
- Functional limitations
- Impairment currently or recently experienced

Risk
- Likelihood of future exacerbations or impairment
- History of exacerbations
- Likelihood of progressive lung function decline
- Concomitant diseases
<table>
<thead>
<tr>
<th><strong>Table 2 – Achieving asthma control</strong></th>
</tr>
</thead>
</table>

**Reduce impairment**
- Prevent chronic and troublesome symptoms
- Require infrequent use of inhaled short-acting β₂-agonist (≤ 2 days per week)
- Maintain normal or near-normal pulmonary function
- Maintain normal activity levels
- Meet patients’ expectation of, and satisfaction with, asthma care

**Reduce risk**
- Prevent recurrent exacerbations
- Minimize need for emergency department visits or hospitalizations
- Prevent progressive loss of lung function
- Provide optimal pharmacotherapy, with minimal or no adverse effects
Assessment of Asthma Control

- Takes place after treatment is initiated
- Requires scheduled and consistent monitoring and follow-up
- Requires objective and subjective measures
- Considers both impairment and risk
## How To Define Control

<table>
<thead>
<tr>
<th></th>
<th>Well Controlled</th>
<th>Completely Controlled</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Symptoms</strong></td>
<td>≤2x/wk</td>
<td>None</td>
</tr>
<tr>
<td><strong>β-agonist</strong></td>
<td>≤2x/wk</td>
<td>None</td>
</tr>
<tr>
<td><strong>Nocturnal awakenings</strong></td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td><strong>Limitations</strong></td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td><strong>Patient/Clinician Assessment</strong></td>
<td>Well</td>
<td>Completely</td>
</tr>
<tr>
<td><strong>Lung Function</strong></td>
<td>Normal or PB</td>
<td>Normal or PB</td>
</tr>
<tr>
<td><strong>Inflammation</strong> (eNO)</td>
<td>? None</td>
<td>None</td>
</tr>
</tbody>
</table>

PB=Personal best.
Follow-up assessment

- Are you wheezing? Times/week
- Are you coughing, having shortness of breath or chest tightness?
- Times per week of bronchodilator use?
- Daily peak flows? Review pattern
- Are you exercising?
- How are you sleeping?
- Review of medications, any problems with them?
<table>
<thead>
<tr>
<th>Table 3 – Conditions that affect asthma control or mimic asthma</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Comorbid conditions that affect asthma control</strong></td>
</tr>
<tr>
<td>Gastroesophageal reflux disease</td>
</tr>
<tr>
<td>Rhinosinusitis</td>
</tr>
<tr>
<td>Allergic bronchopulmonary aspergillosis</td>
</tr>
<tr>
<td>Obstructive sleep apnea</td>
</tr>
<tr>
<td>Chronic obstructive pulmonary disease</td>
</tr>
<tr>
<td>Obesity</td>
</tr>
<tr>
<td>Tobacco smoking</td>
</tr>
<tr>
<td>Stress</td>
</tr>
<tr>
<td>Depression</td>
</tr>
<tr>
<td><strong>Conditions that mimic asthma symptoms</strong></td>
</tr>
<tr>
<td>Vocal cord dysfunction</td>
</tr>
<tr>
<td><em>Bordetella pertussis</em> infection</td>
</tr>
<tr>
<td>Tracheal obstruction</td>
</tr>
<tr>
<td>Heart failure</td>
</tr>
<tr>
<td>Obesity</td>
</tr>
<tr>
<td>Churg-Strauss syndrome</td>
</tr>
</tbody>
</table>

\(^a\) May also mimic asthma symptoms.
<table>
<thead>
<tr>
<th>Causes of uncontrolled asthma</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not recognizing uncontrolled asthma</td>
</tr>
<tr>
<td>Taking the wrong medications or doses</td>
</tr>
<tr>
<td>Improper inhaler technique</td>
</tr>
<tr>
<td>Continued environmental allergen exposure</td>
</tr>
<tr>
<td>Not taking medications for fear of adverse effects</td>
</tr>
<tr>
<td>Poor health care access</td>
</tr>
<tr>
<td>Lack of patient education</td>
</tr>
<tr>
<td>Poor patient adherence</td>
</tr>
<tr>
<td>Cost</td>
</tr>
</tbody>
</table>
Thank you
Summary

• Asthma management is now focused on control of the individual patient’s asthma symptoms, a paradigm shift from earlier recommendations of a step-wise increase in therapy based on asthma severity;
• Patient self-management plans play an important role in prevention of exacerbations;
• Successful asthma treatment leads to better control, reduced long term impairment, decreased costs for hospitalization, and decreased death rates;
• Patient education, establishing a partnership between you and the patient, defining short and long term goals, and a better understanding of asthma management by everyone are essential components of asthma management.
The Initial Consultation

- Assess extent of asthma
- Determine if airflow obstruction is reversible
- Question patient about current symptoms
- Review
  - Risks, benefits, side effects of treatment
  - Peak flow measurements
The Initial Consultation (cont’d)

- Establish contract with patient
  - What physician and staff can provide
  - Expectations for symptom control
- Set goal for lifelong wellness
- Ensure patient leaves with
  - Individualized treatment plan
  - Information about asthma
  - Sample medication
  - Instruction on appropriate use of medication
Patient-Physician Partnership

- Establish sense of partnership between the health-care professionals and patients
- Establish contract between the health-care professionals and patients
- Open communication about concerns, fears, risks, and benefits of treatment plan
- Respect the patients’ views and needs
- Reduce misunderstanding, mistrust, or concealment
Severity and Control Are Related
What causes a wheeze?

- If airway obstruction is present, the widening of the airways during **inspiration (active process)** allows air to pass towards the alveoli.

- **BUT**, during **exhalation (passive process)** the airways close & air becomes trapped in small, peripheral airways.

- As more air is trapped, enough pressure builds peripherally to force it out through partly obstructed air passages.
What causes a wheeze?

- The turbulent air squeezing through narrowed airways causes a wheezing or whistling sound.
- The smaller the airway, the more high-pitched the sound; the larger the obstructed airway, the harsher the sound.
Wheezing in infants

- The small size of the airways in children predisposes to wheezing
- Resistance to airflow is inversely related to the radius of the airway raised to the fourth power
  - *Even small degrees of obstruction are important*
- Peripheral airways can contribute 50% of the total airway resistance
Dyspnea

♦ The subjectivity of dyspnea means that the degree of discomfort may not correlate with objective measures of ventilatory changes
♦ The degree of dyspnea may be influenced by:
  ♦ Psychological state
  ♦ Bodily pre-occupation
  ♦ Level of awareness
  ♦ Usual level of activity
  ♦ Body weight
  ♦ State of nutrition
  ♦ Medications
Dyspnea in asthma

- Dyspnea = air hunger, shortness of breath
- In asthma, dyspnea is associated with:
  - airflow obstruction
  - hypoxemia or
  - psychological dysfunction (somatization, anxiety or depression)
Cough – what is cough?

♦ Cough is a reflex. Cough receptors are non-myelinated vagal nerves located in the epithelium and mucosa. They are found most abundantly in the larynx, trachea, and main stem bronchi;

♦ The cough reflex center is located diffusely in the medulla oblongata;

♦ The cough center also receives connections from other vagal innervations (nose, paranasal sinuses, pharynx, middle ear and tympanic membrane, pleura, pericardium, diaphragm, esophagus, ventricles).
The act of cough

- A cough starts with a deep inspiration
- The glottis closes and the expiratory respiratory muscles contract
- There is a sudden opening of the glottis and a rapid, forceful expiration; a deep cough
- The purpose of cough is to clear the trachea and bronchial tree of secretions and foreign substances
The most common underlying conditions causing chronic cough

- Postnasal drip: Rhinitis, sinusitis, adenoiditis
- Lung disease: Asthma, bronchitis
- Gastro-esophageal reflux and laryngopharyngeal reflux
- Adverse effects of medications: ACE inhibitors
- Patients may have any or all of these conditions simultaneously
Cough variant asthma

- Cough may be the only symptom of asthma - *cough variant asthma*
- Such patients may not wheeze or have dyspnoea
- Pulmonary function reflects airflow obstruction
- Repeat pulmonary function tests after bronchodilator usually show >10% improvement
- Cough variant asthma responds to asthma treatment