Asthma: Beyond the Guidelines
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Clinical Professor
University of Colorado School of Medicine

Disclosures
- Speaker’s Bureau: TEVA, Merck
- I will be including information “off label”
- NHLBI asthma recommendations vs. package insert

Goals
- Since EPR-3 Guideline Publication, review advances in….
  - Knowledge
  - Diagnosis
  - Treatments and Medications
  - Future Treatments
About Me

NHLBI

1991  Asthma is an inflammatory disease
1997  Early recognition and treatment
2002  Update on selected topics
2007  EPR-3: Guidelines for Diagnosis & Management of Asthma
2007 NHLBI Asthma Guidelines
EPR-3: Components of Asthma Management
http://www.nhlbi.nih.gov/guidelines/asthma/asthgdln.htm

1: Assess & monitor severity & control
2: Education for a partnership in care
3: Control environmental factors and co-morbid conditions that affect asthma
4: Medications

400 pages of easy reading!

In 2007, asthma is....
- Lung Disorder
  - Chronic airway inflammation
    - Neutrophils
    - Eosinophils
    - Lymphocytes
    - Mast cell activation
    - Epithelial cell injury
  - Bronchial hyper-reactivity
  - Bronchoconstriction with airflow limitation
  - Sx’s: cough, wheeze, SOB, chest tightness

In 2013, asthma is....complicated!
- Lung Disorder
  - Chronic airway inflammation
    - Mast cell activation, neutrophils
    - Epithelial cells: structural changes
    - Eosinophils receptors for cysteine leukotrienes expressed on eosinophil granule membranes
    - Dendritic cells: increase in sputum of asthmatic
    - T cells: Th2 and Th17 cytokines
    - Cytokines, receptor and signaling molecules:
      - IL-4,5,13, TSLP (thymic stromal lymphopoietin), toll-like rc
  - Bronchial hyper-reactivity
  - Bronchoconstriction
  - Genetic contribution
KEY DIFFERENCES FROM 2002 EXPERT PANEL REPORT

- Critical role of inflammation further substantiated.
- Gene-by-environmental interaction:
  - Allergic & viral infections are key.
- Onset of asthma for most begins early in life.
- Current treatment with anti-inflammatory Rx does not prevent progression of underlying disease severity.

INTERPLAY BETWEEN AIRWAY INFLAMMATION AND CLINICAL SYMPTOMS AND PATHOPHYSIOLOGY: 2007

- Inflammation
- Airway Hyperresponsiveness ↔ Airway obstruction
- Clinical Symptoms

AIRWAY INFLAMMATION: 2013
Key Points: Asthma Guidelines 2007

- Assess severity & control (basis of treatment)
  - Impairment and risk
  - 3 age groups
  - No “Mild Intermittent”
  - No use of diurnal variation of Peak Flows
  - Spiro and SABA (≥ 5 y/o)
  - Co-morbid: OSA, VCD, GERD, ABPA, obesity, stress

- Proper use of meds: Controller vs quick relief
  - Preferred and alternative

2007 Guidelines: Key Differences in Severity

- Risk for exacerbations
  - Severe or persistent airflow obstruction
  - >1 ED visit or hospitalization in past year
  - Any intubation/ICU; especially past 5 yrs
  - Frightened by asthma
  - Female, nonwhite, smoker, non-use of ICS
  - Psychosocial factors: depression, stress

Key Points: Guidelines 2007 (cont.)

- Patient Education: symptoms are variable
  - Good communication: identify concerns, self-confidence
  - Emphasize daily management and early recognition and written “Asthma Action Plan”
  - Health literacy may affect delivery of care

- Physician Education:
  - Improve system-based interventions
  - Multi-dimensional approach, case studies, interactive formats
  - Certified Asthma Educator Course
Asthma Severity

Mild Moderate Severe

Zacharisen, M. J Asthma & Allergy Educators 2010

Classifying Asthma Severity—Impairment

Components of Severity

<table>
<thead>
<tr>
<th>Classification of Asthma Severity</th>
<th>Intermittent</th>
<th>Persistent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Symptoms</td>
<td>Mild</td>
<td>Moderate</td>
</tr>
<tr>
<td>Nighttime awakening</td>
<td>≤2 wk</td>
<td>&gt;2 wk</td>
</tr>
<tr>
<td>Short-acting β-agonist for symptoms prevention</td>
<td>≤2 d/wk</td>
<td>&gt;2 d/wk; not daily</td>
</tr>
<tr>
<td>Interferes with activity</td>
<td>None</td>
<td>Mild limitation</td>
</tr>
<tr>
<td>Lung function</td>
<td>Normal FEV1, FEV1/FVC</td>
<td>Normal FEV1, FEV1/FVC</td>
</tr>
<tr>
<td>Normal FEV1, FEV1/FVC</td>
<td>FEV1 &gt;80%, FEV1/FVC &gt;85%</td>
<td>FEV1 &gt;80%, FEV1/FVC &gt;85%</td>
</tr>
<tr>
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<td>FEV1 &gt;80%, FEV1/FVC &gt;85%</td>
</tr>
</tbody>
</table>

Recommended for all age groups
Children ≤4 y
Children 5–11 y
Persons ≥12 y

Classifying Asthma Severity—Risk

Components of Severity

<table>
<thead>
<tr>
<th>Classification of Asthma Severity</th>
<th>Intermittent</th>
<th>Persistent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risk</td>
<td>Mild</td>
<td>Moderate</td>
</tr>
<tr>
<td>Ever hospitalization and emergency department visit</td>
<td>≤1/year</td>
<td>≤2/year</td>
</tr>
<tr>
<td>Ever hospitalization and emergency department visit</td>
<td>≤1/year</td>
<td>≤2/year</td>
</tr>
<tr>
<td>Consider severity and internal since last exacerbation</td>
<td>≤1/year</td>
<td>≤2/year</td>
</tr>
<tr>
<td>Frequency and severity may fluctuate over time for patients in any severity category</td>
<td>≤1/year</td>
<td>≤2/year</td>
</tr>
</tbody>
</table>

Recommended for all age groups
Children ≤4 y
Children 5–11 y
Persons ≥12 y
### Managing Asthma in Children ≤4 yrs

<table>
<thead>
<tr>
<th>Classification of Asthma Severity</th>
<th>Intermittent</th>
<th>Persistent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1</td>
<td>Mild</td>
<td>Moderate</td>
</tr>
<tr>
<td>Step 2</td>
<td>Moderate</td>
<td>Severe</td>
</tr>
<tr>
<td>Step 3</td>
<td>Severe</td>
<td></td>
</tr>
</tbody>
</table>

#### Recommended Step for Initiating Treatment
- **Step 1:** Preferred: SABA prn
- **Step 2:** Preferred: low-dose ICS
- **Step 3:** Alternative: cromolyn or LTRA
- **Step 4:** Preferred: medium-dose ICS
- **Step 5:** Preferred: medium-dose ICS + either LABA or montelukast
- **Step 6:** Preferred: high-dose ICS + either LABA or montelukast

#### Step up if needed
- First, check adherence, environmental control, and comorbid conditions.

#### Assess control
- Step down, if possible (and asthma is well controlled for at least 3 months).

#### NAEP Report 3: Guidelines for the Diagnosis and Management of Asthma. August 2007

### Managing Asthma in Children 5–11 yrs

<table>
<thead>
<tr>
<th>Classification of Asthma Severity</th>
<th>Intermittent</th>
<th>Persistent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1</td>
<td>Mild</td>
<td>Moderate</td>
</tr>
<tr>
<td>Step 2</td>
<td>Moderate</td>
<td>Severe</td>
</tr>
<tr>
<td>Step 3</td>
<td>Severe</td>
<td></td>
</tr>
</tbody>
</table>

#### Recommended Step for Initiating Treatment
- **Step 1:** Preferred: SABA prn
- **Step 2:** Preferred: low-dose ICS
- **Step 3:** Alternative: cromolyn, LTRA, nedocromil, or theophylline
- **Step 4:** Preferred: low-dose ICS + LABA
- **Step 5:** Preferred: medium-dose ICS + either LABA or montelukast
- **Step 6:** Preferred: high-dose ICS + LABA + oral steroid

#### Step up if needed
- First, check adherence, environmental control, and comorbid conditions.

#### Assess control
- Step down, if possible (and asthma is well controlled for at least 3 months).

#### NAEP Report 3: Guidelines for the Diagnosis and Management of Asthma. August 2007

### Managing Asthma in Patients ≥12 yrs

<table>
<thead>
<tr>
<th>Classification of Asthma Severity</th>
<th>Intermittent</th>
<th>Persistent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1</td>
<td>Mild</td>
<td>Moderate</td>
</tr>
<tr>
<td>Step 2</td>
<td>Moderate</td>
<td>Severe</td>
</tr>
<tr>
<td>Step 3</td>
<td>Severe</td>
<td></td>
</tr>
</tbody>
</table>

#### Recommended Step for Initiating Treatment
- **Step 1:** Preferred: SABA prn
- **Step 2:** Preferred: low-dose ICS
- **Step 3:** Alternative: cromolyn, LTRA, nedocromil, or theophylline
- **Step 4:** Preferred: medium-dose ICS + LABA
- **Step 5:** Preferred: medium-dose ICS + LABA + oral steroid
- **Step 6:** Preferred: high-dose ICS + LABA + oral steroid

#### Step up if needed
- First, check adherence, environmental control, and comorbid conditions.

#### Assess control
- Step down, if possible (and asthma is well controlled for at least 3 months).

#### NAEP Report 3: Guidelines for the Diagnosis and Management of Asthma. August 2007

### Patient Education and Environmental Control at Each Step
- **Steps 2–4:** Consider SQ allergen immunotherapy if allergic asthma.

### Quick-Relief Medication for All Patients
- Consult with asthma specialist if step-4 or higher is required. Consider consultation at step 3.

### Asthma Control for Children 0-4 yrs old

<table>
<thead>
<tr>
<th>Components of Control</th>
<th>Classification of Asthma Control (0-4 yr old)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Impairment</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>Interferes with normal activity</td>
<td>None</td>
</tr>
<tr>
<td>Short-acting β₂ agonist for symptoms</td>
<td>≤ 2 days/week</td>
</tr>
</tbody>
</table>

| Risk | Well controlled | Not well controlled | Very poorly controlled |
| Attacks requiring oral steroids | ≤ 1yr | 2-3x/yr | > 3x/yr |
| Treatment related adverse effects | Consider severity and interval since last exacerbation |

| Recommended Action for Treatment | Maintain | Step up 1 and re-evaluate | Step up 1-2, pred and re-evaluate |

Adapted from NAEPP, NHLBI, NIH. Expert Panel Report 3: Guidelines for the Diagnosis and Management of Asthma. August 2007

### Asthma Control for Children 5-11 yrs old

<table>
<thead>
<tr>
<th>Components of Control</th>
<th>Classification of Asthma Control (5-11 yr old)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Impairment</td>
<td>Well controlled</td>
</tr>
<tr>
<td>Symptoms</td>
<td>≤ 2 days/week but not more than once a day</td>
</tr>
<tr>
<td>Nighttime awakenings</td>
<td>≤ 1x/month</td>
</tr>
<tr>
<td>Interferes with normal activity</td>
<td>None</td>
</tr>
<tr>
<td>Short-acting β₂ agonist for symptoms</td>
<td>≤ 1x/day</td>
</tr>
<tr>
<td>FEV₁ or peak flow</td>
<td>≥80% pred</td>
</tr>
<tr>
<td>FEV₁/FVC</td>
<td>&gt;80%</td>
</tr>
</tbody>
</table>

| Risk | Well controlled | Not well controlled | Very poorly controlled |
| Attacks requiring oral steroids | ≤ 1yr | 2-3x/yr | > 3x/yr |
| Reduced lung growth | Evaluation requires long term follow up |
| Treatment related adverse effects | Med side effects vary in intensity |

| Recommended Action for Treatment | Maintain | Step up 1 and re-evaluate | Step up 1-2, pred and re-evaluate |

### Asthma Control for ≥12 yrs old

<table>
<thead>
<tr>
<th>Components of Control</th>
<th>Classification of Asthma Control (≥12 yr old)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Impairment</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>Interferes with normal activity</td>
<td>None</td>
</tr>
<tr>
<td>Short-acting β₂ for symptoms</td>
<td>≤ 2 days/week</td>
</tr>
<tr>
<td>FEV₁ or peak flow</td>
<td>≥80% pred</td>
</tr>
<tr>
<td>ValidatedQuestionnaires</td>
<td>ATAQ</td>
</tr>
<tr>
<td>ACQ</td>
<td>≥20</td>
</tr>
<tr>
<td>ACT</td>
<td>2.75-3.5</td>
</tr>
</tbody>
</table>

| Risk | Well controlled | Not well controlled | Very poorly controlled |
| Attacks requiring oral steroids | ≤ 3x/yr | 4-6x/yr | > 6x/yr |
| Reduced lung growth | Consider severity and interval since last exacerbation |
| Treatment related adverse effects | Med side effects vary in intensity |

| Recommended Action for Treatment | Maintain | Step up 1 and re-evaluate | Step up 1-2, pred and re-evaluate |
Asthma: Last 5 years

- Pubmed search: “asthma” 26,346 articles
- I will review each article.....

Asthma Evaluation

- History
  - Symptoms, timing
  - Triggers: environment, meds, occupation
- Examination
  - ENT, Chest, Skin
- Lung Function
  - Spirometry, response to SABA
- Lung Inflammation
  - FeNO (exhaled nitric oxide)
- Chest x-ray
- Other
  - Allergy evaluation, Methacholine challenge,
  - CBC, Sweat Cl, ABPA, serum Alpha1-AT, pH probe

Advances in Diagnosis

- Biomarkers: Exhaled Nitric Oxide (FeNO)
  - 2007: “Usefulness is currently being evaluated…”
  - 2011 Official ATS Clinical Practice Guideline: Interpretation of FeNO for Clinical Applications AJRCCM 2011;184:602
  - Diagnosis of eos airway inflammation
  - Monitor airway inflammation in asthma pts
  - Likelihood of steroid responsiveness
  - Support diagnosis of asthma
Advances in Diagnosis

- Measures of BHR (bronchial hyper-reactivity)
- Direct:
  - Methacholine, histamine, acetylcholine, carbachol
- Indirect:
  - Hypertonic saline, Mannitol, Adenosine, Exercise
- 2010: FDA approves mannitol bronchial-challenge test kit.
- Why?
  - Quick, simple: hand held DPI-easy administration
  - Minimal equipment, low cost, enhanced safety
  - More reproducible and less time than methacholine
  - Therapeutically equivalent to methacholine

Ann Allergy Asthma Immunol. 2011;106(2):91

Asthma Pharmacotherapy

<table>
<thead>
<tr>
<th>Quick Reliever</th>
<th>Controller</th>
</tr>
</thead>
<tbody>
<tr>
<td>SABA</td>
<td></td>
</tr>
<tr>
<td>Albuterol</td>
<td>Inhaled steroids</td>
</tr>
<tr>
<td>Lev-albuterol</td>
<td>Long-acting beta agonist</td>
</tr>
<tr>
<td>Pirbuterol</td>
<td>Leukotriene modifiers</td>
</tr>
<tr>
<td>Anticholinergic</td>
<td>Theophylline</td>
</tr>
<tr>
<td>Ipratropium*</td>
<td>Anti-IgE antibody: Xolair</td>
</tr>
<tr>
<td>Oral steroid burst</td>
<td>Cromolyn</td>
</tr>
<tr>
<td></td>
<td>Anticholinergic* (tiotropium)</td>
</tr>
<tr>
<td></td>
<td>Oral steroids</td>
</tr>
</tbody>
</table>

* Not FDA approved for asthma

End in sight for CFC Inhalers

<table>
<thead>
<tr>
<th>Date for Termination</th>
<th>Name of Drug</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010 June 14</td>
<td>Metaproterenol (Alupent)</td>
</tr>
<tr>
<td>2010 December 31</td>
<td>Cromolyn (Intal)</td>
</tr>
<tr>
<td>2010 December 31</td>
<td>Nedocromil (Tilade)</td>
</tr>
<tr>
<td>2010 December 31</td>
<td>Triamcinolone (Azmacort)</td>
</tr>
<tr>
<td>2011 June 30</td>
<td>Flunisolide (Aerobid)</td>
</tr>
<tr>
<td>2013 July 31</td>
<td>Albuterol + Ipratropium combination</td>
</tr>
<tr>
<td></td>
<td>(Combivent MDI)</td>
</tr>
<tr>
<td>2013 December 31</td>
<td>Pirbuterol (Maxair Autohaler)</td>
</tr>
</tbody>
</table>
Advances in Treatment since 2007

- **LAMA**: Long-acting muscarinic antagonist
  - Tiotropium* (Spiriva): 2004 for COPD
    - Tiotropium improves lung function in pts with severe uncontrolled asthma; randomized controlled trial. JACI 2011;128:308.

- **LABA**:
  - Perforomist* (Formoterol): nebulizer; 2007 for COPD
    - Formoterol for acute asthma in ED: systematic review with meta-analysis.

- **SABA/SAMA**: 2011
  - Combivent Respimat* 1 puff qid
    *Not FDA approved for asthma

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Advances in Treatment since 2007

- **ICS**
  - 2008: Alvesco (Ciclesonide) MDI
    - Ultrafine MDI, pro-drug
  - 2009: Generic Budesonide nebulizer: 0.25 and 0.5 mg
- **LTRA**
  - Montelukast generic: 2009
- **ICS/LABA**
  - 2010: Dulera: (budesonide/formoterol) MDI
    *Not FDA approved for asthma

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**Inhaled Corticosteroids**

<table>
<thead>
<tr>
<th>Generic Name</th>
<th>Trade Name</th>
<th>Form</th>
<th>Dose</th>
<th>Freq</th>
<th>Age</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beclomethasone</td>
<td>Qvar</td>
<td>HFA</td>
<td>40, 80 µg</td>
<td>bid</td>
<td>≥5 yr</td>
<td>$50-90</td>
</tr>
<tr>
<td>Budesonide</td>
<td>Pulmicort</td>
<td>Neb</td>
<td>225, 510, 1,000 µg</td>
<td>bid</td>
<td>≥6 mo</td>
<td>$90 to 150</td>
</tr>
<tr>
<td></td>
<td>generic</td>
<td>DPI</td>
<td></td>
<td></td>
<td>≥6 yr</td>
<td></td>
</tr>
<tr>
<td>Ciclesonide</td>
<td>Alvesco</td>
<td>HFA</td>
<td>50, 100 µg</td>
<td>bid</td>
<td>≥12 yr</td>
<td>$70</td>
</tr>
<tr>
<td>Fluticasone</td>
<td>Flovent</td>
<td>HFA</td>
<td>44, 110, 220 µg</td>
<td>bid</td>
<td>≥ 4 yr</td>
<td>$44-82</td>
</tr>
<tr>
<td></td>
<td>DPI</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mometasone</td>
<td>Asmanex</td>
<td>DPI</td>
<td>110, 220 µg</td>
<td>qd-bid</td>
<td>≥4 yr</td>
<td>$110-160</td>
</tr>
</tbody>
</table>

*Not FDA approved for asthma*
**Combination: ICS+LABA**

<table>
<thead>
<tr>
<th>Generic</th>
<th>Trade Name</th>
<th>Form</th>
<th>Dose</th>
<th>Freq</th>
<th>Age</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fluticasone + Salmeterol</td>
<td>Advair Diskus Advair HFA</td>
<td>DPI HFA</td>
<td>100,250,500/50,45,110,230/21</td>
<td>bid</td>
<td>≥ 4 yr</td>
<td>$200</td>
</tr>
<tr>
<td>Mometasone + Formoterol</td>
<td>Dulera HFA</td>
<td></td>
<td>100,200/5</td>
<td>bid</td>
<td>≥ 12</td>
<td>$230</td>
</tr>
<tr>
<td>Budesonide + Formoterol</td>
<td>Symbicort HFA</td>
<td></td>
<td>80,160/4.5</td>
<td>bid</td>
<td>≥ 25 yr</td>
<td>$170</td>
</tr>
</tbody>
</table>

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**Advances in Treatment**

**Vitamin D**
- Vit D deficiency (serum 25(OH)D <20 ng/mL)
  - Lower lung function in kids with asthma
  - Increased BHR
  - More asthma symptoms and severe asthma attacks
  - Poor response to ICS
  - Worse lung function and more rapid decline in lung function over time in smokers
- Vit D supplementation: may lead to improved asthma control by inhibiting influx of inflammatory cytokines in the lung and increasing secretion of IL-10 by T-reg and dendritic cells

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**Advances in Treatment**

**Vaccines**
- Flublok (Jan 2013)
  - Trivalent recombinant hemagglutinin [rHA] vaccine
  - No egg, adjuvant, preservative (thimerasol) or antibiotics
  - 3X as much “active ingredient” For ages: 18-49 y/o
- Pneumococcal (Oct 2008)
  - PCV13: Pneumococcal conjugate (Prevnar13) infant series
  - PPSV23: Pneumococcal polysaccharide (Pneumovax) age 2-64 yr with asthma; all over 65 yr
  - In 18–49 years, IPD was more common among persons with asthma than persons without asthma (OR= 2.4; 95% confidence interval=1.8–3.3)
Bronchial Thermoplasty

- Indications: severe, refractory asthma
- Bronchoscopy:
  - Radiofrequency heat/thermal energy to decrease smooth muscle mass
  - Decrease exacerbations, improve asthma control/QOL
  - No change in FEV1

Clin Rev Allergy Imn 2012;43(1-2):184-93

Increased Knowledge of Risks

- Singulair and all LTRA
  - Warnings and Precaution: Neuropsychiatric events
    - Agitation, aggressive behavior or hostility, anxiety, depression, disorientation, disturbance in attention, dream abnormalities, hallucinations, insomnia, memory impairment, psychomotor hyperactivity (including irritability, restlessness, tremor), somnambulism, suicidal thinking and behavior.

- LABA in kids.
  - Safety of regular formoterol or salmeterol in children with asthma: overview of Cochrane reviews. Oct 2012. 21 trials on 7474 children (4-17 y/o)
  - 1 child died; risk of nonfatal asthma: 3 children per 1000


Asthma Composite Index:

ED, Hosp, Death

Pediatrics

60,954 total pts in 110 trials, 2 deaths (4-17 y/o) in 9807 kids
Incidence difference for asthma composite index according to age for LABA plus concomitant ICS therapy versus concomitant ICS therapy.

<table>
<thead>
<tr>
<th>Age</th>
<th>ID ( \text{LABA vs ICS} ) (95% CI); Incidence ( % \text{LABA} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>4–11 y</td>
<td>46.6 (24.2 to 69.0); 36.7</td>
</tr>
<tr>
<td>12–17 y</td>
<td>11.1 (5.6 to 18.1); 26.1</td>
</tr>
<tr>
<td>18–64 y</td>
<td>5.1 (0.6 to 10.7); 21.7</td>
</tr>
<tr>
<td>≥65 y</td>
<td>-8.4 (-16.1 to 9.3); 41.5</td>
</tr>
<tr>
<td>Overall</td>
<td>6.1 (0.9 to 11.4); 23.5</td>
</tr>
</tbody>
</table>

Asthma composite incidence difference per 1000 patient-years

Future Treatments

- Vitamin D
- ICS/LABA
  - Ultrafine Beclomethasone/formoterol
- Triple inhaler
  - Tiotropium, formoterol, ciclesonide:"Triohale" in India
- Biologicals
  - Anti-IL-5
  - Anti-IL-13
  - Anti-TNF-alpha

Summary Key Points: Asthma Guidelines

1. Assess severity & control (basis of treatment)
2. Proper use of meds: Controller vs quick relief
3. Symptoms are variable; pts need to recognize sx’s and adjust medications using a written action plan
4. Good communication between pt and clinician helps identify concerns, makes teaching more effective, and promotes self-confidence
5. Patient education
Thank you