Pediatric Asthma Management in EAC

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Definition

Asthma is a **chronic inflammatory disorder of the airways** in which many cells and cellular elements play a role.

The chronic inflammation is associated with the **airway hyperresponsiveness** that leads to **recurrent episodes of wheezing, breathlessness, chest tightness, and coughing**, particularly at night or early morning...

.............often **reversible** either spontaneous or with treatment.
Mechanisms: Asthma Inflammation

Factors of asthma developments
Host: Genetic, Obesity...... Environment: viruses, air pollutants,..

Airway hyperresponsiveness

Airway remodelling

Triggers: allergen, exercise, cold air, etc

Exacerbation
Comparison asthma prevalence between phase 1&3 in 3 centers (2 age groups)
ICS in asthmatic children: 61.6% (2551)
Asthma management in children ≤ 5 years old

• How to diagnose asthma?
• Update GINA guideline 2009 and Thai guideline for children 2008
Asthma management in children $\leq$ 5 years old

- How to diagnose asthma?
- Update GINA guideline 2009 and Thai guideline for children 2008
Diagnosis

Clinical Diagnosis: children & adults
- Episodic wheezing after allergen exposure
- Responding to appropriate asthma therapy: bronchodilators
- Entirely asymptomatic between episodes
- Positive family history of atopy
Diagnosis

Problems in diagnosis especially in young children

1. Atypical case
   - Cough-variant asthma
   - Chronic nocturnal cough
   - etc

2. Many wheezing phenotypes
Diagnosis

Atypical case in older children

Diagnostic test
- Reversibility test: FEV1 > 12%
- PEF variable: 20%

Additional test
- Allergic status: Skin test, specific IgE
Diagnosis

Many wheezing phenotypes in children < 5 years esp less than 3 years old
- Variable response to bronchodilators
- Limitation to routine airflow assessment such as PEF, spirometry
- Mostly trigger allergens are respiratory viral infections
Wheezing prevalence

- Transient early wheezers
- Non-atopic wheezers
- IgE-associated wheeze/asthma

Age in years

Stein et al. 1997; Martinez and Helms 1998

preterm, smoking
Diagnosis

Children < 5 years esp less than 3
Simple clinical index
- Frequent episodes of wheeze (more than once a month) ≥ 3 (Practall guideline)
- Presence of risk factors
  - 1 major: parental history of asthma or eczema or
  - 2/3 minor: eosinophilia, wheeze without cold, allergic rhinitis
Diagnosis

Children ≤ 5 years esp less than 3

Diagnostic test

- Trial of treatment with ICS and short acting bronchodilator
- Marked clinical improvement during treatment and deterioration when it is stopped
Asthma management in children ≤ 5 years old

• How to diagnose asthma?
• Update GINA guideline 2009 and Thai guideline for children 2008
Asthma management
GINA guideline recommendations: updated December 2009
Asthma Management and Prevention Program

Goals of Long-term Management

- Achieve and maintain control of symptoms
- Maintain normal activity levels, including exercise
- Maintain pulmonary function as close to normal levels as possible
- Prevent asthma exacerbations
- Avoid adverse effects from asthma medications
- Prevent asthma mortality
Asthma Management and Prevention Program

Goals of Long-term Management

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Goals of Long-term Management

- Achieve and maintain control of symptoms for prolonged periods

  Assessing asthma control
  Treating to achieve control
  Monitoring to maintain control
Asthma Management and Prevention Program

Goals of Long-term Management

- Achieve and maintain control of symptoms for prolonged periods

Assessing asthma control
Treating to achieve control
Monitoring to maintain control
Assessing asthma control

• Physicians: levels of control
### Levels of asthma control

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Controlled</th>
<th>Partly controlled</th>
<th>Uncontrolled</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(All of following)</td>
<td>(Any in any wk)</td>
<td>Three or more features of partly controlled asthma present In any week</td>
</tr>
<tr>
<td>Daytime</td>
<td>None (&lt;twice/wk)</td>
<td>&gt; twice/week</td>
<td></td>
</tr>
<tr>
<td>Limitations of activity</td>
<td>None</td>
<td>Any</td>
<td></td>
</tr>
<tr>
<td>Nocturnal</td>
<td>None</td>
<td>Any</td>
<td></td>
</tr>
<tr>
<td>Reliever Rx</td>
<td>None (&lt;twice/wk)</td>
<td>&gt; twice/wk</td>
<td></td>
</tr>
<tr>
<td>Lung function</td>
<td>Normal</td>
<td>&lt; 80% predicted</td>
<td></td>
</tr>
<tr>
<td>Exacerbation</td>
<td>None</td>
<td>One or more/yr</td>
<td>One in any wk</td>
</tr>
</tbody>
</table>

*Khon Kaen University Faculty of Medicine*
GINA 2009

Assessing asthma control

- Physicians: levels of control
- Patients:
  - Asthma Control Test (ACT)™
  - Pediatric Asthma Control Test (PACT)™
Take the Asthma Control Test™ and share your results with your doctor.

1. Take the test
2. Print and discuss
3. Take control

Take Control!
Are you committed to taking control of your asthma?
Take the Asthma Control Test and join the Take Control Program!

Healthcare providers...
can now quickly assess Asthma control.
Download & Print the Asthma Control Test and Childhood Asthma Control Test.

Click Here

Ages 12 and over

1. In the past 4 weeks, how much of the time did your asthma keep you from getting as much done as usual?
   - All of the time
   - Most of the time
   - Some of the time
   - A little of the time
   - None of the time

2. During the past 4 weeks, how often have you had shortness of breath?
   - More than once a day
   - Once a day
   - 3 to 6 times a week
   - Once or twice a week
   - Not at all

3. During the past 4 weeks, how often did your symptoms (wheezing, coughing, shortness of breath, chest tightness or pain) wake you up at night or earlier than usual in the morning?
   - 4 or more nights a week
   - 2 or 3 nights a week
   - Once a week
   - Once or twice
   - Not at all

4. During the past 4 weeks, how often have you used your rescue inhaler or nebulizer medication (such as albuterol)?
   - 3 or more times per day
   - 1 or 2 times per day
   - 1 to 2 times per week
   - Once a week or less
   - Not at all

5. How would you rate your asthma control during the past 4 weeks?
   - Not controlled at all
   - Poorly controlled
   - Somewhat controlled
   - Well controlled
   - Completely controlled

Please enter your ZIP code: 32462

Score Facts

1
2
3

SEE YOUR SCORE

Take the Asthma Control Test and click the button to see your score.
Assessment of symptom control: The Childhood Asthma Control Test™
Asthma Management and Prevention Program

Goals of Long-term Management

- Achieve and maintain control of symptoms for prolonged periods

Assessing asthma control

Treating to achieve control

Monitoring to maintain control
Treating to achieve asthma control: an update
## Treatment Steps

<table>
<thead>
<tr>
<th>Step</th>
<th>Controller Options</th>
<th>SELECT ONE</th>
<th>SELECT ONE</th>
<th>ADD ONE OR MORE</th>
<th>ADD ONE OR BOTH</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td>low-dose ICS*</td>
<td>low-dose ICS plus long-acting β₂-agonist</td>
<td>medium- or high-dose ICS plus long-acting β₂-agonist</td>
<td>oral glucocorticosteroid (lowest dose)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>leukotriene modifier**</td>
<td>medium- or high-dose ICS</td>
<td>leukotriene modifier</td>
<td>anti-IgE treatment</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>low-dose ICS plus leukotriene modifier</td>
<td>sustained-release theophylline</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>low-dose ICS plus sustained-release theophylline</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>5</td>
<td></td>
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</tbody>
</table>

*inhaled glucocorticosteroids
** receptor antagonist or synthesis inhibitors
Initial naïve patients with persistent symptoms

**TREATMENT STEPS**

**STEP 1**
- asthma education
- environmental control
- as needed rapid-acting β₂-agonist

**SELECT ONE**
- low-dose ICS*
- leukotriene modifier**

**STEP 2**
- as needed rapid-acting β₂-agonist

**SELECT ONE**
- low-dose ICS plus long-acting β₂-agonist
- medium- or high-dose ICS

**ADD ONE OR MORE**
- medium- or high-dose ICS plus long-acting β₂-agonist
- leukotriene modifier
- sustained-release theophylline

**ADD ONE OR BOTH**
- oral glucocorticosteroid (lowest dose)
- anti-IgE treatment

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*inhaled glucocorticosteroids
**receptor antagonist or synthesis inhibitors
Children ≤5 years

ICS or LTRA
(200 μg BDP equivalent) (dose depends on age)

Insufficient control**

Increase ICS dose or Add ICS to LTRA
(400 μg BDP equivalent)

Insufficient control**

Increase ICS dose (800 μg BDP equivalent)
Or
Add LTRA to ICS
Or
Add LABA

Insufficient control**

Consider other options
* Theophylline
* Oral corticosteroids

Step up therapy to gain control
Step down if appropriate
Inhaled therapies vs oral therapies in children
GINA guidelines for inhaled vs oral therapy

• GINA guidelines state that:

“**Inhaled therapy is the cornerstone of asthma treatment for children of all ages**”

“**ICS are currently the most effective anti-inflammatory medications for the treatment of persistent asthma**”

Initial naïve patients with persistent symptoms

**TREATMENT STEPS**

**REDUCE**

<table>
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<th>STEP</th>
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<th>Add One or More</th>
<th>Add One or Both</th>
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<td>4</td>
<td></td>
<td>low-dose ICS plus leukotriene modifier</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>low-dose ICS plus sustained-release theophylline</td>
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*Inhaled glucocorticosteroids
**Receptor antagonist or synthesis inhibitors
Initial severely uncontrolled

- Reduce
- Increase

**TREATMENT STEPS**

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<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
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</table>

- **SELECT ONE**
  - low-dose ICS
  - leukotriene modifier
  - oral glucocorticosteroid (lowest dose)

- **ADD ONE OR MORE**
  - medium- or high-dose ICS
  - leukotriene modifier
  - anti-IgE treatment

- **ADD ONE OR BOTH**
  - low-dose ICS plus long-acting β₂-agonist
  - sustained-release theophylline

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*inhaled glucocorticosteroids
**receptor antagonist or synthesis inhibitors
# Treatment Steps

**Preferred option for adult and older children > 5 years**

<table>
<thead>
<tr>
<th>ReducE</th>
<th>Decrease Asthma Education</th>
<th>Environmental Control</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Step 1</strong></td>
<td>as needed rapid-acting β₂-agonist</td>
<td></td>
</tr>
<tr>
<td><strong>Step 2</strong></td>
<td>select one</td>
<td>as needed rapid-acting β₂-agonist</td>
</tr>
<tr>
<td><strong>Controller Options</strong></td>
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<tr>
<td></td>
<td>low-dose ICS plus sustained-release</td>
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<td></td>
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*inhaled glucocorticosteroids
**receptor antagonist or synthesis inhibitors
## Treatment Steps

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</tr>
</tbody>
</table>

* For children < 5 years

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*Inhaled glucocorticosteroids
** Receptor antagonist or synthesis inhibitors
# Dose of inhaled corticosteroid

<table>
<thead>
<tr>
<th>Drug</th>
<th>Low</th>
<th>Medium</th>
<th>High</th>
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</thead>
<tbody>
<tr>
<td>Beclomethasone</td>
<td>100</td>
<td>200-400</td>
<td>&gt;400</td>
</tr>
<tr>
<td>Budesonide (MDI)</td>
<td>200</td>
<td>200-400</td>
<td>&gt;400</td>
</tr>
<tr>
<td>Budesonide nebulizer</td>
<td>500</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fluticasone</td>
<td>100</td>
<td>200-500</td>
<td>&gt;500</td>
</tr>
</tbody>
</table>
Goals of Long-term Management

- Achieve and maintain control of symptoms for prolonged periods

Assessing asthma control

Treating to achieve control

Monitoring to maintain control
Monitoring to maintain control
LEVEL OF CONTROL

- controlled
- partly controlled
- uncontrolled
- exacerbation

TREATMENT OF ACTION

- maintain and find lowest controlling step
- consider stepping up to gain control
- step up until controlled
- treat as exacerbation

LEVEL OF CONTROL:

- controlled
- partly controlled
- uncontrolled
- exacerbation

TREATMENT STEPS:

- STEP 1
- STEP 2
- STEP 3
- STEP 4
- STEP 5
## Children > 5 years old

### Treatment Steps

<table>
<thead>
<tr>
<th>Step</th>
<th>Reduce</th>
<th>Increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>-</td>
<td>asthma education</td>
</tr>
<tr>
<td>2</td>
<td>environmental control</td>
<td>as needed rapid-acting ( \beta_2 )-agonist</td>
</tr>
<tr>
<td>3</td>
<td>as needed rapid-acting ( \beta_2 )-agonist</td>
<td>low-dose ICS*</td>
</tr>
<tr>
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<tr>
<td>5</td>
<td>oral glucocorticosteroid (lowest dose)</td>
<td>anti-IgE treatment</td>
</tr>
</tbody>
</table>

#### Controller Options

**SELECT ONE**
- low-dose ICS*
- leukotriene modifier**
- leukotriene modifier
- low-dose ICS plus leukotriene modifier
- low-dose ICS plus sustained-release theophylline

**SELECT ONE**
- low-dose ICS plus long-acting \( \beta_2 \)-agonist
- medium- or high-dose ICS plus long-acting \( \beta_2 \)-agonist
- sustained-release theophylline

**ADD ONE OR MORE**
- medium- or high-dose ICS
- leukotriene modifier

**ADD ONE OR BOTH**
- as needed rapid-acting \( \beta_2 \)-agonist

*Inhaled glucocorticosteroids

** Receptor antagonist or synthesis inhibitors
Children ≤ 5 years

Step up with doubling the initial dose

Allergy 2008
Treating to maintain asthma control

Duration and adjustments to treatment

• The initial treatment should be given for at least 3 months to establish its effectiveness in reaching control

• When achieves control, follow up may be 3-6 months interval
Treating to maintain asthma control

When control is not achieved

- Check the inhalation technique and compliance before step up of treatment
- Check the avoidance of allergen especially passive smoking
- Review the diagnosis and look for co-morbidity such as AR, sinusitis
Inhalation device
<table>
<thead>
<tr>
<th>Age group</th>
<th>Preferred device</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 4 years</td>
<td>Pressurized MDI with spacer via face mask</td>
</tr>
<tr>
<td>4 - 6 years</td>
<td>Pressurized MDI with spacer via mouthpiece</td>
</tr>
<tr>
<td>&gt; 6 years</td>
<td>Dry powder inhaler (DPI) or Breath-actuated pressurized MDI or pressurized MDI with spacer</td>
</tr>
</tbody>
</table>
THANK YOU