Association of Asthma Educators: Becoming an Asthma Educator and Care Manager

Produced by the Alabama Department of Public Health Video Communications and Distance Learning Division

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Medication Classification
• Quick relief medications
  – Medications used to treat acute symptoms and exacerbations
• Long term control medications
  – Medications used every day to achieve and maintain control of persistent asthma

Medications
• Medications classifications
• Stepwise approach
• Inhalation devices

Medication Classification
• Quick relief medications
  – Short acting β2-Agonists (SABA)
  – Anticholinergics
  – Oral steroid “burst” therapy
Medication Classification

- Long term control medications
  - Inhaled corticosteroids (ICS)
  - Long acting β₂-agonists (LABA)
  - Leukotriene modifiers
  - Non-steroidal anti-inflammatories
  - Theophylline
  - Immunomodulator
  - Daily oral steroids

Quick Relief Medications

- Short acting β₂-Agonists (SABA)
- Anticholinergics
- Oral steroid “burst” therapy

Short Acting β₂-Agonists (SABA)

- Albuterol
  - Proventil HFA®, Ventolin HFA®, ProAir®
  - Meter dose inhaler, solution for nebulization, tablets

- Levalbuterol (Xopenex®)
  - Meter dose inhaler, solution for nebulization

- Pirbuterol (Maxair®)
  - Autohaler
    - Meter dose inhaler

Short Acting β₂-Agonists (SABA)

- Affect the lungs by attaching to and relaxing the smooth muscles that wrap around the bronchi to improve asthma control
- Onset of action: rapid ~10 minutes
- Duration of action: ~ 4 hours
Short Acting β2-Agonists (SABA)

- Dosing: 2 puffs q4-6hrs PRN for symptoms
  - May use 15 minutes before exercise to pre-treat
  - To be immediately available to the patient at all times

- Clinically significant side effects associated with SABA are Skeletal Muscle Tremor and Tachycardia
- Increased use, greater than 1 canister per month, is an indicator of patient over reliance on short acting medication and may increase the risk for life-threatening exacerbations

Short Acting β2-Agonists (SABA)

- Baylor’s Rules of Two Questions™
  - Do your patients use their quick-relief inhaler more than TWO times a WEEK?
  - Do they awaken at night with asthma more than TWO times a MONTH?

- Do they refill their quick-relief inhaler more than TWO times a YEAR?
  - Has their peak flow dropped more than TWO times 10 (20%) from baseline when having asthma symptoms?

Short Acting β2-Agonists (SABA)

- If the answer is “yes” to any of these questions, the health care professional should reevaluate patient’s current treatment regimen

- Data suggest regular use associated with asthma morbidity and mortality
- Causal link not yet established
- β2-agonists should be prescribed for rescue or quick relief
- Prevention of exercised-induced asthma

Current Consensus on Short-Acting β2s

- Baylor Health Care System

4/27/2012
Current Consensus on Short-Acting β2s

- Increased use (>2 times/week) signals deteriorating control and need for daily anti-inflammatory therapy.

Short Acting β2-Agonists (SABA)

- Patient to call if:
  - Needing more often than q4h for symptoms
  - Needing every 4 hours
  - Not responding to treatment within 15 minutes
  - Getting worse

Anti-Cholinergics

- Ipratropium (Atrovent®)
- Tiotropin (Spiriva®)-FDA approved only in COPD
- Combination
  - Albuterol/Ipratropium (Combivent® or DuoNeb®)
- Safe
- Approved for COPD and asthma exacerbations
- Synergistic effect with SABA
- Not FDA approved for children

Oral Corticosteroids

- Medrol
- Prednisone
- Prednisolone syrup
- Orapred®, Prelone®, Pediapred®
- May be used for quick relief
  - Burst during an acute exacerbation for 3-10 days
- Long-term control in severe asthma
  - Daily dosing
  - Alternate day dosing
  - Combined with inhaled corticosteroid
Oral Corticosteroids

- Long term side effects:
  - Osteoporosis
  - Hypertension
  - Diabetes
  - HPA axis suppression
  - Obesity
  - Skin thinning
  - Muscle weakness
  - Hypertension
  - Diabetes
  - HPA axis suppression
  - Easy bruising
  - Muscle weakness

Long Term Control Medications

- Inhaled corticosteroids (ICS)
- Long acting β2-agonists (LABA)
- Leukotriene modifiers
- Non-steroidal anti-inflammatories
- Theophylline
- Immunomodulator
- Daily oral steroids

Inhaled Corticosteroids (ICS)

- “They are the most potent and effective anti-inflammatory medication currently available.”
- “ICSs are used in the long-term control of asthma.”
  - Expert Panel Report 3 (EPR-3)

Inhaled Steroids

<table>
<thead>
<tr>
<th>Product</th>
<th>Generic Name</th>
<th>Color</th>
<th>Doses/Puff</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alvesco</td>
<td>Ciclesonide</td>
<td>Tan/Red</td>
<td>80mcg, 160mcg</td>
</tr>
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- **Pro-Drug:** administered in an inactive (or significantly less active) form
  - Once administered, enzymatically activated by lung mucosal tissue to active form
  - Potential to reduce oral side effects seen with other inhaled corticosteroids

- Only inhaled corticosteroid with category B pregnancy rating
  - Pharmacotherapy outcomes in pregnancy:
    - Maximize lung function
    - Minimize drug side effect

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- **Pregnancy pearls:**
  - If well controlled on current therapy continue therapy
  - When starting inhaled corticosteroid therapy consider Budesonide (Pulmicort®) since it is the most studied

Inhaled Steroids

- New generation inhaled corticosteroids
  - New parent drug: Mometasone, Ciclesonide
  - New formulation: HFA

Quiz– ICS Potency for a 5 Year Old Child with Asthma

- Assign low, medium, or high dose:
  a) beclomethazone 80 mcg/puff
     QVAR 2 puffs BID
  b) budesonide 250 mcg neb.
     Pulmicort 0.25 mg QID
  c) fluticasone 220 mcg Flovent 220 mcg 1 puff BID

Method 1 – “I will count puffs…”

- Assign low, medium, or high dose to:
  a) beclomethazone 80 mcg/puff
     QVAR 2 puffs BID 4 High?
  b) budesonide 250 mcg neb.
     Pulmicort 0.25 mg QID? No Puffs
  c) fluticasone 220 mcg Flovent 220 mcg 1 puff BID 2 Low?

Method 2 – “I’ll Count MCG…”

- Assign low, medium, or high dose to:
  a) beclomethazone 80 mcg/puff
     QVAR 2 puffs BID 320 Low?
  b) budesonide 250 mcg neb.
     Pulmicort 0.25 mg QID 1000 High?
  c) fluticasone 220 mcg Flovent 220 mcg 1 puff BID 440 Med?
Inhaled Corticosteroids (ICS)

- **Effects**
  - Anti-inflammatory, decrease hyper-responsiveness, decrease secretions, and restore integrity
  - Improve function
  - Early intervention more effective

- **Inadequately prescribed by providers**
  - Inaccurate determination of persistent disease
  - Safety concerns

- **Inadequately taken by patients**
  - Reluctance to use daily therapy
  - Fear of “steroids” and confusion with anabolic steroids
  - Lack of perception of effect

**Inhaled Corticosteroids (ICS)**

- Inhaled corticosteroids can be dosed at low, medium, or high doses
- Most benefits of ICS occur at low to medium doses

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**Inhaled Corticosteroids (ICS)**

Pre- and post-3-month treatment with budesonide (BUD) 600 mcg b.i.d. n =14

- **E** = Epithelium  **BM** = Basement Membrane

Modified from http://www.nhlbi.nih.gov/guidelines/asthma/asthsumm.pdf. Figure 18
Inhaled Corticosteroids (ICS)

- Local side effects
  - Throat irritation, irritative cough, candidiasis, hoarseness

- High dose inhaled side effects (rare and substantially less than with oral steroids)
  - May affect growth velocity in children if used long-term, but severe asthma that is uncontrolled also can cause growth suppression

- May affect serum osteocalcin levels and skin thickness in elderly
- Potential for systemic effects in children at 400 mcg of beclomethasone or budesonide

- Rare adrenal gland suppression and elevated blood sugars with greatest risk at high doses
- Theoretical risk of disseminated varicella
**Inhaled Corticosteroids (ICS)**

- The provider/educator action is:
  - Teach patient about delay onset of action
  - Teach patient to take EVERY DAY
  - Demonstrate proper technique
  - Have patient demonstrate technique

**Inhaled Corticosteroids (ICS)**

- Instruct patient to use a spacer for MDI
- Instruct patient to rinse and spit after use
- Teach patient when to change canister

**Long-acting β2-Agonists (LABA)**

- Formoterol (Foradil®)
- Salmeterol (Serevent®)
- Arformoterol (Brovana®) = for COPD only
- Performist (Formoterol®) = for COPD only

**Long-Acting β2-Agonists (LABA)**

- Effects
  - Long-acting → 12 hours for prevention
  - Smooth muscle relaxation
  - Variable onset of action

**Long-Acting β2-Agonists (LABA)**

- The agents should be used for the shortest time possible to achieve symptom control
- Once patients are no longer experiencing symptoms, LABAs should be discontinued if possible

**Long-Acting β2-Agonists (LABA)**

- Black Box Warning:
  - LABAs should only be used long-term in patients with asthma not adequately controlled with inhaled steroids
Long-Acting $\beta_2$-Agonists (LABA)

- Children and adolescents needing a LABA should use a combination product that also contains an inhaled steroid to ensure compliance with both medications.

Long-Acting $\beta_2$-Agonist (LABA)

- The provider/educator action is:
  - Teach patient to take EVERY DAY
  - Use with an inhaled anti-inflammatory
  - Never use more than every 12 hours
  - Not to be used to treat acute symptoms

Combination Therapy

- ICS/LABA
  - Fluticasone/Salmeterol (Advair®) in mcg
    - Dry Powder: 100/50, 250/50, 500/50
    - MDI: 45/21, 115/21, 230/21

Combination Therapy

- Budesonide/Formoterol (Symbicort®) in mcg
  - MDI: 80/4.5, 160/4.5
  - Mometasone/Formoterol (Dulera®) in mcg
    - MDI: 100/5, 200/5

Combination Therapy

- “For patients not well controlled on low-dose inhaled corticosteroid (ICS), increasing the dose of ICSs to medium dose is recommended before adding adjunctive therapy in the 0–4 years age group.”

Combination Therapy

- “For other age groups (children 5–11 years of age and youths ≥12 years of age and adults), increasing the dose of ICS to medium dose or adding adjunctive therapy to a low dose of ICS are considered as equal options.”
  - Expert Panel Report 3 (EPR-3)
Leukotriene Modifiers

- Montelukast (Singulair®)
- Zafirlukast (Accolate®)
- Zileuton (Zyflo CR®)

Leukotriene Modifiers

- Leukotrienes are inflammatory molecules that mediate airflow obstruction, hyperresponsiveness and inflammation through multiple channels
  - Leukotriene D4 is a potent bronchoconstrictor at least 1000 times more potent than histamine

Leukotriene Modifiers

- Montelukast is available for patients >1 year of age
- Zafirlukast is available for patients ≥7 years of age
- Zileuton is available for patients ≥12 years of age

Leukotriene Modifiers

- Montelukast (Singulair®)
  - No known drug-drug interactions
- Zafirlukast (Accolate®)
  - Take on empty stomach
  - Inhibits metabolism of warfarin and increases prothrombin time
  - LFTs prior and during

Leukotriene Modifiers

- Zileuton (Zyflo CR®)
  - Take on empty stomach
  - LFTs prior and during

Leukotriene Modifiers

- “Leukotriene Receptor Antagonist (LTRAs) are alternative, but not preferred, therapy for the treatment of mild persistent asthma (Step 2 care).”
Leukotriene Modifiers

- “LTRAs can also be used as adjunctive therapy with ICSs, but for youths ≥12 years of age and adults they are not the preferred adjunctive therapy compared to the addition of LABAs.”
- “Zileuton can be used as alternative but not preferred adjunctive therapy in adults.”
  
  — Expert Panel Report 3 (EPR-3)

Non-steroidal Anti-inflammatories

- Cromolyn
  - Blocks early and late phase reactions
  - Mast cell stabilizer
  - Inhibits acute response to exercise, cold dry air, and sulfur dioxide

Non-steroidal Anti-inflammatories

- 4-6 week trial
- Nebulizer form
  - Difficult to obtain product will eventually be removed from market
  - Approved for 2 yrs and older

Non-steroidal Anti-inflammatories

- “They are used as alternative, but not preferred, medication for the treatment of mild persistent asthma.”
- “They can also be used as preventive treatment prior to exercise or unavoidable exposure to known allergens.”
  
  — Expert Panel Report 3 (EPR-3)

Methlyxanthine

- Theophylline
  - Theo-24®, Theochron®, Theolair®, Uniphyl®

Methlyxanthine

- Effects
  - Long-acting bronchodilator with possible anti-inflammatory properties
  - Narrow therapeutic range (5-15 mcg/ml)
  - Monitor blood level at least annually
**Methlyxanthine**
- Side Effects
  - Nausea, vomiting, reflux
  - Tachycardia, arrhythmias
  - Sleep disorders, seizures in toxic state
  - Interact with many medicines

**Methlyxanthine**
- Theophylline levels are increased by:
  - Cimetidine, Propranolol, Erythromycin, Clarithromycin, Zileuton
  - Theophylline increases effect of anticoagulants
  - Theophylline decreases effect of:
    - Lithium, Phenobarbital, Phenytoin, Carbamazepine

**Methlyxanthines**
- The provider action is:
  - Teach patient to take EVERY DAY
  - May cause GI irritation
    - Take with food
  - Annual blood level
    - 5-15 mcg/mL

**Methlyxanthines**
- Do not switch brands without monitoring level
- Once daily doses
  - Take at 6-7 PM
  - Monitor for drug-drug interactions
  - Side effect may occur at therapeutic doses

**Methlyxanthines**
- “Sustained-release theophylline is a mild to moderate bronchodilator used as alternative, not preferred, adjunctive therapy with ICS.”
  - Expert Panel Report 3 (EPR-3)

**Immunomodulator**
- Omalizumab (Xolair®)
**Immunomodulator**
- Recombinant humanized monoclonal antibody to IgE that may potentially serve as a long-term controller in patients:
  - 12 years of age or older
  - Moderate to severe persistent asthma

- Positive skin test or in vitro reactivity to a perennial aeroallergen
- Symptoms are inadequately controlled by ICS

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**Stepwise Approach to Asthma**
- Treatment is initiated according to the patient’s highest component of severity

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**Stepwise Approach to Asthma**
- Stepwise approach to Asthma
  Therapy emphasizes initiating higher level therapy at the onset to establish prompt control and then stepping down

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**Stepwise Approach**
- Treatment is initiated according to the patient’s highest component of severity
Stepwise Approach

| Patient is Reassessed in 2-6 week for effectiveness of therapy. When patient is controlled for 3 months therapy is step down. |
|---|---|---|---|---|
| **Age** | **Step 1** | **Step 2** | **Step 3** | **Steps 4-6** |
| 0-4 yrs | SABA PRN | Low ICS | Consult Asthma Specialist | Consult Asthma Specialist |
| 5-11 yrs | SABA PRN | Low ICS | Low ICS + LABA, LTRA, or Theophylline OR Medium ICS | Consult Asthma Specialist |
| 12+ yrs | SABA PRN | Low ICS | Low ICS + LABA OR Medium ICS | Consult Asthma Specialist |

Best Add-on Therapy Giving Effective Responses (BADGER)

- Asked the question, Which is the best when a child with asthma (5-11 yrs olds) is poorly controlled despite low dose corticosteroid use?
  - The best response was shown in:
    - Approximately 40% of the children by adding the LABA

Allergen Immunotherapy

- May be considered for asthma patients steps 2-4 and/or 5 year to adult:
  - “When there is clear evidence of a relationship between symptoms and exposure to an allergen to which the patient is sensitive.”
Allergen Immunotherapy

- Mechanisms of action:
  - Decreases allergen specific IgE production
  - Inhibits seasonal rise in allergen-specific IgE
  - Produces allergen-specific IgG
  - Decreases organ-specific inflammatory cells

- Demonstrated reduction in asthma symptoms caused by exposure to grass, cat, house-dust mite, ragweed, Cladosporium and Alternaria

- Course of allergy immunotherapy typically 3-5 years’ duration

- Should be administered in a physician's office with trained personnel

  - Expert Panel Report 3 (EPR-3)

Drug Hypersensitivity

- Patients with asthma may be more sensitive to the following medications:
  - Aspirin/NSAIDs
    - Anaphylaxis
  - Nonselective Beta-blockers
    - Bronchospasm
  - ACE inhibitors
    - Cough

Key Education Messages Provided by Clinician