

# Asthma Update: Pharmacological and Educational Strategies for Managing Asthma

Maureen McCloskey RN  
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## Objectives

- The learner will be able to define the four levels of asthma severity and how level of severity is determined.
- The learner will be able to discuss common medications and delivery devices for asthma medications
- The learner will be able to describe a patient/family education plan with the goal of teaching asthma self-management.

## What is Asthma

- A chronic lung disease consisting of;
  - Airway inflammation (swelling and excess mucus production)
  - Airway hypersensitivity and reactivity
  - Bronchospasm (squeezing)



## Asthma Symptoms

- Coughing
- Shortness of breath
- Wheezing may or may not be present
- Chest pain or tightness

- The National Heart, Lung, Blood Institute (NHLBI) has developed guidelines for the management of asthma, EPR-3 2007
- Available to review at:
  - <http://www.nhlbi.nih.gov/guidelines/asthma/>

## Classification

- Classification of severity level should be done at time of diagnosis of the disease to initiate treatment, the newest guidelines focus on control of symptoms.

## Severity

- Components of severity include:
  - Frequency of symptoms
  - Nighttime awakenings
  - Short-acting beta-agonists use for symptom treatment
  - Interference with daily activity
  - Lung functions-FEV<sub>1</sub>, peak flow, FEV<sub>1</sub>/FVC
  - Need for oral corticosteroids

## Severity

- Four levels of severity according to the EPR 3
  - Intermittent
  - Mild persistent
  - Moderate persistent
  - Severe persistent

## Intermittent

- Symptoms  $\leq 2$  days/week
- Nighttime awakenings  $\leq 2$  times per month
- Short acting B<sub>2</sub> agonists for symptom control  $\leq 2$  days/week
- No interference with normal activity
  - No controller medication needed

## Mild Persistent

- Symptoms  $> 2$  days/week not daily
- Nighttime awakenings  $\leq 4$  times per month
- Short acting B<sub>2</sub> agonists for symptom control  $>2$  days/week not daily
- Occasional interference with activity
  - start low dose inhaled cortico steroid

## Moderate Persistent

- Symptoms daily
- Nighttime awakenings 3-4 times per month or  $>$  once a week not daily
- Short acting B<sub>2</sub> agonists for symptom control daily
- More limitation with activity
  - Higher dose inhaled cortico steroids or combined therapy

## Severe Persistent

- Symptoms all day
- Nighttime awakenings  $>$  once a week usually every night
- Short acting B<sub>2</sub> agonists for symptom control several times per day
- Limits activity
  - High dose inhaled cortico steroid plus long acting beta<sub>2</sub> agonist as well as additional therapy (singulair)

## Diagnosis of Asthma and Initiation of Treatment

- If a child (0-4 years of age) has > four episodes of wheezing in the past year that lasted > one day that affected sleep and has \*a positive asthma predictive index:
- Either one of the following
  - A parental history of asthma, physician diagnosed atopic dermatitis, or evidence of sensitization to aeroallergens
- Or two of the following
  - Evidence of sensitization to foods, or >4% peripheral blood eosinophilia, or wheezing apart from colds
  - Initiation of long-term control therapy is recommended

## Control of Asthma

### Reduce impairment

- Prevent chronic and troublesome symptoms
- Infrequent use (<2 days per week) of inhaled SABA (not including prevention of EIB)
- Maintain (near) normal pulmonary function
- Maintain normal activity level (including exercise and school attendance)
- Meet patient and family expectations and satisfaction with asthma care

## Assessing Asthma Control Three Levels of Control

- Well controlled
  - No increase in current treatment
  - Follow up 1-6 months
  - Consider stepping down treatment

## Assessing Asthma Control Three Levels of Control

- Not well controlled
  - Step up one step in therapy
  - Follow up in 2-4 weeks

## Assessing Asthma Control Three Levels of Control

- Poorly controlled
  - Consider oral steroid
  - Step up 1-2 steps
  - Follow up 1-2 weeks

## Types of Asthma Medications

### Long-Term Control

- Inhaled corticosteroids-preferred
- Long-acting beta2-agonists (add to ICS step 3-6 depending on age)
- Leukotriene modifier (add on step 4-6)
- Oral corticosteroids (in some severe patients/step 6)
- Others/alternatives: cromolyn, nedocromil, methylxanthines

### Quick-relief medications

- Short-acting beta2-agonists
- Anticholinergics
- Systemic corticosteroids

## Asthma Medications; Long Term Control

**Inhaled corticosteroids** – beclomethasone/QVAR, budesonide/Pulmicort, fluticasone/AeroBid, fluticasone/Flovent, mometasone/Asmanex, triamcinolone acetate/Azmacort

- These medicines work to reduce and control airway inflammation
- Must be taken every day (as ordered) whether or not child has symptoms
- Has little systemic absorption (dose dependent) so that side effects are minimal (esp. related to growth)

\*generic/brand name

## Asthma Medications Long Term Control

### Side Effects of Inhaled corticosteroids

- Dry cough and hoarseness
- Oral fungal infections - thrush
  - Teach patients to rinse mouth out-as per Asthma Care Plan
- Low-medium doses of ICS may have the potential of decreasing growth velocity by ~1cm in the first year of treatment, but is not sustained or progressive-Monitor growth
  - Agertoft, L. & Pedersen, S. Effect of Long-Term Treatment with Inhaled Budesonide on Adult Height in Children With Asthma N Engl J Med 2000; 343: 1064-1069

## Asthma Medications Long Term Control

### Inhaled corticosteroids - Teaching Points

- Have child rinse mouth out with water or brush teeth after use
- These medicines make take a week or more to work-Patient doesn't "feel" them working
- Need to stress that side effects are minimal and that inhaled steroids go directly to airways where they are needed and not to other parts of the body
- Need to teach parents that ICS are not like anabolic steroids taken by athletes to build muscle.

## Asthma Medications Long Term Control

**Leukotriene modifiers**-montelukast/Singulair, zafirlukast/Accolate, zileuton/Zyflo (may cause liver toxicity)

- Not first line therapy or monotherapy for persistent asthma
- These medicines work by blocking the receptor or modifying specific leukotrienes
- Must be taken every day (as ordered) whether or not child has symptoms
- Singulair can be used in children as young as 12 months, comes in granules and chewable tablets

## Asthma Medications Long Term Control

### Leukotriene modifiers - Side Effects

- Usually well tolerated
- Headache
- Nausea, diarrhea, abdominal pain
- Muscle aches
- Dream abnormalities/insomnia
- Increased liver enzymes

## Asthma Medications Long Term Control

### Leukotriene modifiers- Teaching Points

- Most children are instructed to take one dose at bedtime to minimize any side effects
- Not first line long-term control medication for persistent asthma, used as add-on to ICS
- Montelukast also used to treat allergic rhinitis

## Quick Relief Medications

- Short-acting beta2agonists:
  - Albuterol/Proventil HFA, Ventolin HFA, ProAir HFA
  - levalbuterol/Xopenex
  - pirbuterol/Maxair
- Therapy of choice for relief of acute symptoms and prevention of exercise induced bronchospasm
- Anticholinergics:
  - Ipratropium/Atrovent
- Systemic corticosteroids:
  - Prednisone/prednisolone/Orapred, Pediapred, Prelone

## Quick Relief Medications

### Albuterol and pirbuterol- Side Effects

- Tachycardia
- Muscle tremor
- Hypokalemia
- Headache

### Ipratropium-Side Effects

- Dry mouth/secretions
- Blurred vision if gets in eyes

## Quick Relief Medications

### Systemic corticosteroids

methylprednisolone/Medrol, Solu-Medrol, prednisolone/Orapred, Pediapred, Prelone, prednisone

- Used for acute exacerbation of asthma symptoms
- To prevent the progression of the exacerbation, speed recovery recovery/resolution of airflow obstruction and reduce rate of relapse
- Usually prescribed in “bursts” of 5 days, but a burst can be from 3-10 days
- No weaning necessary for short courses

## Quick Relief Medications

### Systemic Corticosteroids - Side Effects

- Abnormalities in glucose metabolism (urine may dip + for glucose)
- Fluid retention
- Weight gain
- Mood alteration
- Hypertension
- Side effects temporary when given for short bursts

## Medications for Asthma Long-Term Control Medications

Type	GenericName	Brand Name	Method	Side Effects
Anti-inflammatory Inhaled Corticosteroids	Becloethasone	QVAR	Inhaler	Cough, hoarseness, oral thrush (fungal infection)
	Budesonide	Pulmicort	Flexhaler or Nebulizer	
	Fluticasone	Aerobid	Inhaler	
	Fluticasone	Flovent HFA	Inhaler	
	Fluticasone	Azmacort	Inhaler	
Long acting beta-agonists	Formoterol	Foradil	Aerolizer	Shaky, nervous, tachycardia
	Salmeterol	Serevent	Diskus	
Combination drug	Fluticasone-salmeterol (Advair) (Formoterol)	Advair Symbicort	Diskus and inhaler Inhaler	Dry mouth, thirst, jittery
Leukotriene modifiers	Montelukast	Singulair	Pill and granules	Nausea, diarrhea, headache, increased liver enzymes, muscle aches, abdominal pain, dream abnormalities
	Zafirlukast	Akromin	Pill	
	Zileuton	Zyflo	Pill	
Anti-inflammatory	Ciclesonide	Inhal	Inhaler or Neb	Mouth dryness
	Salmeterol	Stride		
Methylxanthines	Theophylline	Theo-24, Elanophyllin, Uniphyll, others	Sustained release capsules or tablets, IV	Nausea, vomiting, headache, stomach ache, tachycardia.

## Medications for Asthma Quick Relief Medications

Type	GenericName	Brand Name	Method	Side Effects
Bronchodilator	Albuterol	Proventil HFA Ventolin HFA ProAir HFA	Inhaler or Nebulizer	Tachycardia, muscle tremor, headache, hypokalemia
	Levalbuterol	Xopenex	Inhaler or Nebulizer	
	Pirbuterol	Maxair	Autohaler	
Anticholinergics	Ipratropium	Atrovent	Inhaler or Nebulizer	Dry mouth, dry respiratory secretions, blurred vision if gets in eyes
Systemic Corticosteroids	Prednisone	Liquid Pred Deltasone	Liquid or Pills	Glucose metabolism abnormalities (urine may dip + for glucose), fluid retention, weight gain, mood alteration, hypertension, increased appetite
	Prednisolone	Prelone Orapred Pediapred	Liquid or Pills	
	Methylprednisolone	Medrol SoluMedrol	Pills IV	

## Asthma Devices

- Metered Dose Inhalers/MDI
- Chambers or spacers with facemask or mouthpiece
- Dry Powder Inhalers/DPI
- Peak flow meter
- Nebulizer/air compressor with facemask or mouthpiece

## Asthma Devices: MDIs



## Asthma Devices: Chambers / Spacers

- Children should not take MDIs without a chamber to ensure optimal aerosol deposition
- Available in a variety of sizes (facemasks) and brands
- In addition to assessing/teaching proper administration technique, also include how to clean and when to replace

## One Way Valve holding Chamber with mouthpiece



One Way Valve Holding Chambers are available with different size facemasks for patients from infancy to-adolescence/adult



## Using a spacer with a mask



## Asthma Devices: Dry Powder Inhalers / DPIs

Different manufacturers make different devices with different medications and different administration considerations

- Aerolizer
- Diskus
- Handihaler
- Flexhaler
- Twisthaler



DPI: Pulmicort/budesonide flexhaler



DPI:Diskus

Advair/purple\*Serevent/green



DPI: Aerolizer available as Foradil  
(formoterol)



## NEBULIZER

- Device used to administer aerosol medicines to a patient by inhalation of a mist created by an air compressor
- Blowby is not an acceptable administration technique



## Peak Flow Meters



## Peak Flow Monitoring

- PEF: Peak expiratory flow measures rate of airflow which can drop before the onset of symptoms related to obstruction from inflammation and/or bronchoconstriction
- Expressed as L/M: liters/minute
- Peak flow reading should be done at the same time (before taking meds) everyday/morning is best
- The highest number achieved when well is that child's "personal best"

## Spirometry

- Used to measure whether or not airflow obstruction (due to airway inflammation and/or bronchoconstriction) is present,
  - if present the degree of obstruction and whether or not the obstruction is reversible (improvement/increase in values re-measured after a child is given a bronchodilator)
- A tool that can aid in making the diagnosis of asthma
- Used to monitor asthma control and response to treatment
- Correct technique, calibration of spirometer, and maintenance of spirometer are necessary in order to obtain accurate results

## Developing an Asthma Care Plan

### Key educational messages:

- Provide all patients with a written daily self-management plan
  - Teach and reinforce at every encounter
  - Includes specifics of when and how to take rescue actions

## Developing an Asthma Care Plan

- If child is monitoring peak flows at home, acceptable ranges for each zone:
  - **green zone** (80-100% of the personal best)
  - **yellow zone** (50-80% of the personal best)
  - **red zone** (50% or less of the personal best) should be in the care plan plan

## Developing an Asthma Care Plan

### Individualized instructions

- Medicines to take everyday
- Medicines to take when symptoms start
- Medicines for flares
- Instructions when to call provider if symptoms don't improve or worsen
- Red zone emergency instructions
- Peak flow zones if applicable

## Developing an Asthma Care Plan

- Should be given to all patients with asthma
- Always ask patients on the telephone or in the office if they have/know how to use an Asthma Care Plan.
- Asthma Care Plans should be used to inform others (such as school nurses, teachers, coaches and child care providers) about a child's symptoms and treatment plan

## Developing an Asthma Care Plan-using peak flow monitoring

- ◆ Uses 3 color zones to determine the plan for treatment
  - ◆ Green Zone - Breathing is good with no symptoms and full activity. Peak flow 80-100% of personal best.
  - ◆ Yellow Zone - WARNING! Symptoms are present or peak flow is below 80% of personal best
  - ◆ Red Zone - EMERGENCY! Symptoms are severe and medical help is necessary.

## Developing an Asthma Care Plan

Example:

8 year old who has a “personal best” of 300 L/M

- Green zone is 300-240 L/M-80-100%
- Yellow Zone is 240-150 L/M-50-80%
- Red Zone is below 150 L/M-50% or less of the personal best

## Education for Self Management

- Asthma is a chronic condition and will require ongoing teaching over many visits with frequent reinforcement of information
- Teaching will be different for sick visits, hospitalization vs well visits
- Take advantage of teachable moments

## Education for Self Management

### Sick Visit/hospitalization/ER

- Teaching should focus on identifying possible triggers for current exacerbation
  - Can the parent identify the trigger for the current asthma flare up? (infection, environmental, etc.)
  - Were there warning signs that an asthma flare was beginning?
  - What action was taken?
  - Were medications increased as per the Asthma Care Plan?

## Education for Self Management

### Sick Visit/hospitalization/ER (cont)

- Review of prescribed medicines
- Ensure that parent/care giver knows to refill medications before they run out
- Review of asthma device skill needed to administer medication properly
- Teach expected course of symptoms and when to call back if symptoms persist
- Be sure that family has a plan to accompany verbal teaching

## Education for Self Management

### Well Child Visit for Asthma

Teach and reinforce key educational messages at every encounter

- Basic facts about asthma
- Roles of medications
- Skills medication administration and self-monitoring
- Environmental control measures
- Asthma Care Plan: How and when to take rescue actions

## Education for Self Management

### General “teaching tips”

- Teach in small “bites” - Present teaching over several visits with frequent repetition and reinforcement
- Use simple terminology
- Have learner give verbal feedback or return demonstration of what you have taught them

## Education for Self Management

### General “teaching tips”

- Refer families to **Community Asthma Prevention Program** classes if available and home visitor program.

### Other resources:

- Check with the patient’s insurance company (some have asthma education programs)

### FYI:

- **DPI:** Dry powder inhaler
- **EIB:** Exercise induced bronchospasm
- **ICS:** Inhaled corticosteroid: beclomethasone, budesonide, flunisolide, fluticasone, mometasone, triamcinolone
- **LABA:** Inhaled long-acting beta2-agonist: formoterol, salmeterol
- **MDI:** Metered dose inhaler
- **SABA:** Short-acting beta2-agonist: albuterol

**QUESTIONS????**