Adult asthma management: focus on control

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Objectives

- **Apply NHLBI National Asthma Education and Prevention Program (NAEPP) guidelines**
  - **Impairment**
  - **Risk**
- **Routine assessment of control**
  - **Practical tools**

Evolution of the Asthma Guidelines

- 1991
  - Treatment recommendations based on consensus
- 1997
  - Evidence based treatment recommendations
- 2002
  - Further clarification of treatment of children
- 2007
  - Emphasis on assessment of control

NHLBI NAEPP EPR-3 2007

- Control
  - Degree to which the manifestations of asthma are *minimized* and the goals of therapy are met
- Impairment
  - *Frequency* and *intensity* of symptoms
  - *Functional limitations*
- Risk
  - Likelihood of *exacerbations* or *loss of pulmonary function*

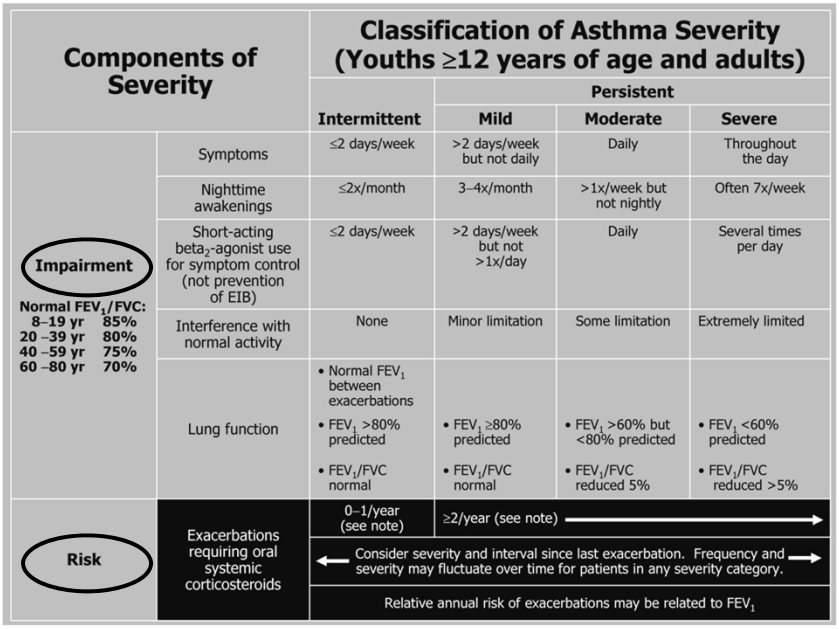
NAEPP EPR–3 2007. NIH Item No. 08–4051 http://www.nhlbi.nih.gov/guidelines/asthma/index.htm. Accessed February 12, 2007.

NAEPP EPR-3 2007 Guidelines

- Asthma *severity*
  - Chronic status
  - Represents potential impairment & risk
- Asthma *control*
  - Volatile status
  - Represents a point in time where impairment & risk can be evaluated & measured

Application of EPR-3 Guidelines

- Initial visit
  - Classify severity
  - Determine initial therapy or adjust accordingly
- Follow-up visit
  - Evaluate control
  - Adjust therapy based step-wise approach



Components of Severity		Classification of Asthma Severity (Youths ≥12 years of age and adults)			
			Persistent		
		Intermittent	Mild	Moderate	Severe
Impairment	Symptoms	≤2 days/week	>2 days/week but not daily	Daily	Throughout the day
	Nighttime awakenings	≤2x/month	3–4x/month	>1x/week but not nightly	Often 7x/week
	Short-acting $beta_2$-agonist use for symptom control (not prevention of EIB)	≤2 days/week	>2 days/week but not >1x/day	Daily	Several times per day
Normal FEV_1/FVC: 8–19 yr 85%; 20–39 yr 80%; 40–59 yr 75%; 60–80 yr 70%	Interference with normal activity	None	Minor limitation	Some limitation	Extremely limited
	Lung function	• Normal FEV_1 between exacerbations • FEV_1 >80% predicted • FEV_1/FVC normal	• FEV_1 ≥80% predicted • FEV_1/FVC normal	• FEV_1 >60% but <80% predicted • FEV_1/FVC reduced 5%	• FEV_1 <60% predicted • FEV_1/FVC reduced >5%
Risk	Exacerbations requiring oral systemic corticosteroids	0–1/year (see note)	≥2/year (see note) →		
		← Consider severity and interval since last exacerbation. Frequency and severity may fluctuate over time for patients in any severity category. →			
		Relative annual risk of exacerbations may be related to FEV_1			

NAEPP EPR–3 2007. NIH Item No. 08–4051 http://www.nhlbi.nih.gov/guidelines/asthma/index.htm. Accessed February 12, 2007.

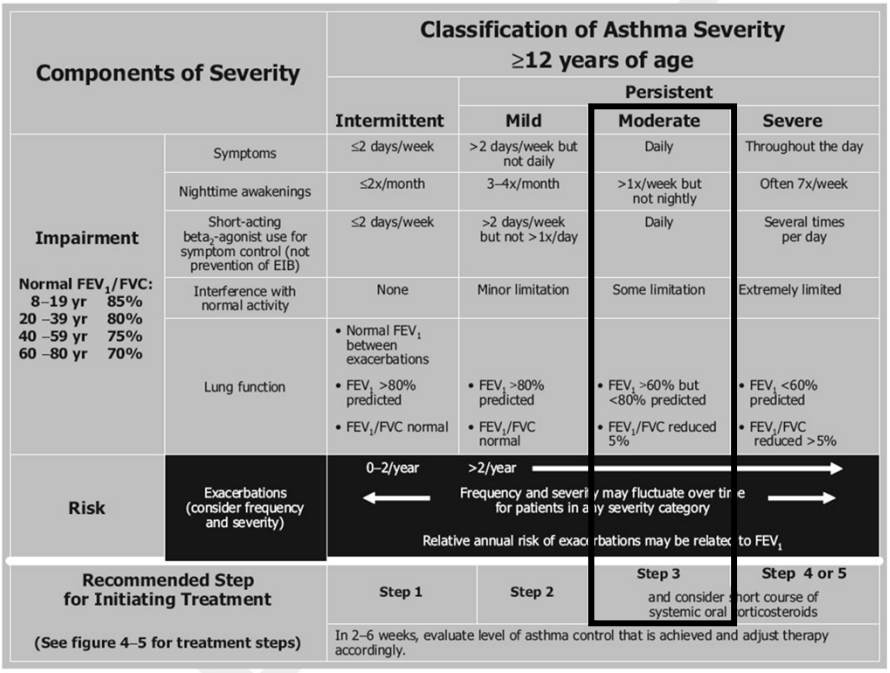
Case: 24 year AA female presents for asthma evaluation

- Diagnosed in childhood
- 0 hospital stays since age 16, never intubated
- ED visit last month, no other exacerbations this year
- SOB with exertion, smoke, stress, sports
- Nocturnal symptoms 1-2/week
- SABA 10-12 puffs daily (sometimes prior to sports)
- Reports SOB, cough, occ. audible wheezing

Case: 24 year AA female presents for asthma evaluation

- Hx of GERD, allergic rhinitis
- Montelukast in past, “unsure if helped”, non-adherent to Advair
- Exam with boggy nasal turbinates, clear lungs
- CXR normal
- Spirometry with mild obstruction, reversible with albuterol

What therapy would you prescribe?



Components of Severity		Classification of Asthma Severity ≥12 years of age			
			Persistent		
		Intermittent	Mild	Moderate	Severe
Impairment	Symptoms	≤2 days/week	>2 days/week but not daily	Daily	Throughout the day
	Nighttime awakenings	≤2x/month	3–4x/month	>1x/week but not nightly	Often 7x/week
	Short-acting $beta_2$-agonist use for symptom control (not prevention of EIB)	≤2 days/week	>2 days/week but not >1x/day	Daily	Several times per day
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Risk	Exacerbations (consider frequency and severity)	0–2/year	>2/year		
		← Frequency and severity may fluctuate over time for patients in any severity category →			
		Relative annual risk of exacerbations may be related to FEV_1			
Recommended Step for Initiating Treatment		Step 1	Step 2	Step 3 and consider short course of systemic oral corticosteroids	Step 4 or 5
(See figure 4–5 for treatment steps)		In 2–6 weeks, evaluate level of asthma control that is achieved and adjust therapy accordingly.			

Stepwise Approach for Managing Asthma in Youths ≥12 Years of Age and Adults

Step 1

Preferred:
SABA PRN

Step 2

Preferred:
Low-dose ICS

Alternative:
Cromolyn, nedocromil, LTRA, or theophylline

Step 3

Preferred
Low-dose ICS + LABA

OR

Medium-dose ICS

Alternative:
Low-dose ICS + either LTRA, theophylline, or zileuton

Step 4

Preferred:
Medium-dose ICS + LABA

Alternative:
Medium-dose ICS + either LTRA, theophylline, or zileuton

Step 5

Preferred:
High-dose ICS + LABA

AND

Consider omalizumab for patients who have allergies

Step 6

Preferred:
High-dose ICS + LABA + oral corticosteroid

AND

Consider omalizumab for patients who have allergies

Intermittent | **Persistent**

SABA = short-acting $beta_2$-agonist; ICS = inhaled corticosteroid; LTRA= leukotriene receptor antagonist; LABA = long-acting $beta_2$-agonist. *NAEPP EPR–3 2007.* NIH Item No. 08–4051 http://www.nhlbi.nih.gov/guidelines/asthma/index.htm.
Accessed February 12, 2007.

Benefits of Inhaled Corticosteroids

- Most effective long-term controller for persistent asthma
- Improve pulmonary function
- Reduce symptom severity, rescue inhaler use, and need for oral corticosteroids
- Reduce number of exacerbations, ED visits, and hospitalizations
- May prevent airway remodeling

Take home points about LABAs

- Black box warning for LABAs
- Should NOT be used as monotherapy for asthma
- No current data supporting increased risk of adverse asthma related events if used in combination with ICS

Ernst et al. Ann Int Med 2006;145:692-694.
Chowdhury at al. NEJM 2011;364:2473-2475.

Leukotriene Modifiers

- Work better than placebo
- Do NOT work as well as ICS
- Do NOT work as well as long acting beta agonists in combination with ICS

JACI 2000; 105:1123-1129.

Case follow-up

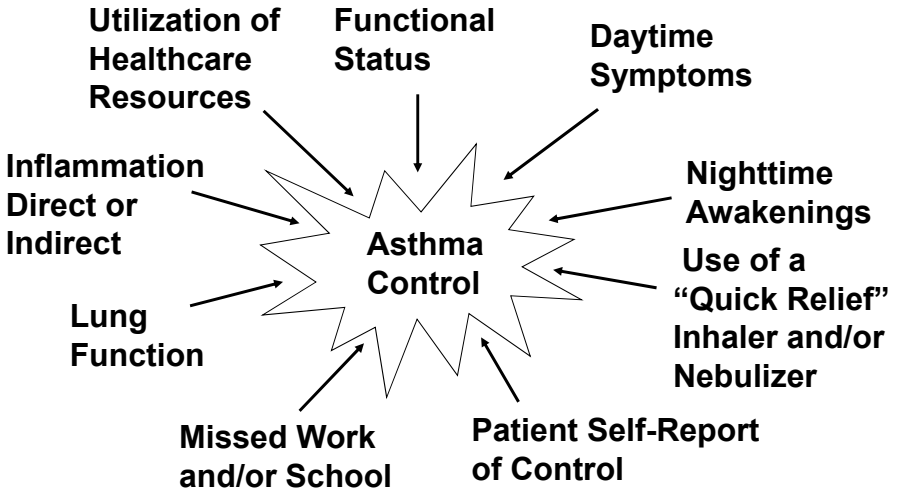
- Prescribed medium dose inhaled fluticasone with spacer
- Returns 6 weeks later
- Feels asthma is “better but not great”
- Back to running & aerobics but still using SABA albuterol 4-6 puffs max/day
- Nocturnal awakenings 2-3 times/month

Case follow-up

- Allergies and post-nasal drip improved with season change
- Exam normal

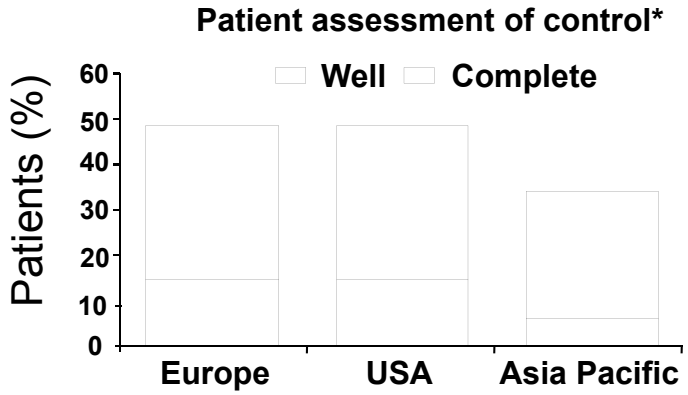
Is this patient's asthma controlled?

How Should Control Be Measured in Asthma?



Adapted from Chipps BE, Spahn JD. *J Asthma*. 2006;43:567-572.

Patients Are Poor at Assessing Their Asthma Control



***Patients with severe persistent symptoms – past 4 wk: Sx ≥ 3x/day in the daytime; Most nights/every night.**

Rabe KF, et al. *Eur Respir J*. 2000;16:802-807.
www.asthmainamerica.com
Wong GWK, et al. *Eur Respir J*. 2002;19:288-293.

Asthma Severity: Patient Perception

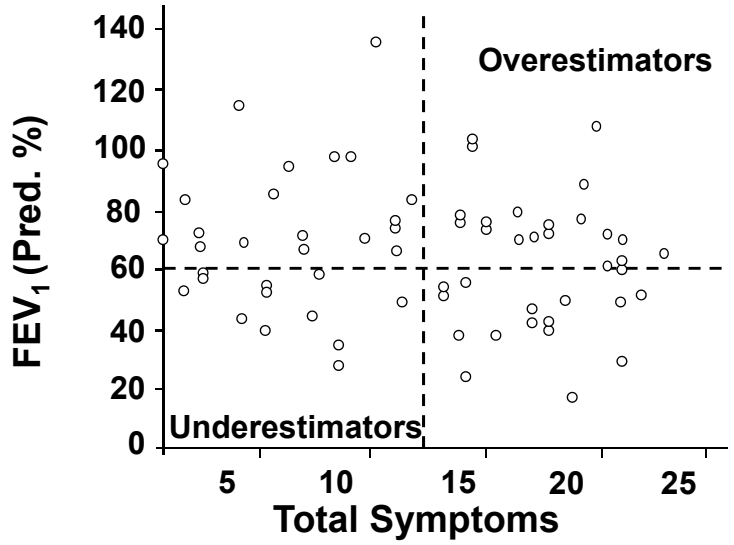
Patient Self-Classification

NAEPP Guidelines

Symptoms	Severe	Moderate	Mild	Intermittent
None	4.8%	10.4%	13.1%	48.6%
Mild	31.9%	47.2%	60.1%	42.3%
Moderate	41.3%	36.3%	22.1%	8.1%
Severe	21.9%	5.8%	4.5%	0.8%

Asthma in America, 2001

Asthma Symptoms Correlate Poorly With FEV_1



Reproduced with permission from Teeter JG, et al. *Chest*. 1998;113:272-277.

Monitoring Asthma Control: Asthma Control Test™

1. In the past **4 weeks,** how much of the time did your **asthma** keep you from getting as much done at work, school or at home?

   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 **asthma** 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 weeky ○ 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 ○ 2 or 3 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 ○ ☐

Level of Control Based on Composite Score

20-25 = Controlled

14-19 = Suboptimal

<14 = Poorly Controlled

Regardless of patient's self assessment of control in Question 5

Nathan RA. *J Allergy Clin Immunol*. 2004;113:59-65.

http://www.asthma.com. Accessed June 25, 2011.

Asthma Therapy Assessment Questionnaire (ATAQ)

1. **In the past 4 weeks did you miss any work, school, or normal activities due to your asthma? (1 point for yes)**
2. **In the past 4 weeks, did you wake up at night because of your asthma? (1 point for yes)**
3. **Do you believe your asthma was well controlled in the past 4 weeks? (1point for no)**
4. **Do you use an inhaler for quick relief of asthma symptoms? If yes, in the past 4 weeks, what was the highest number of puffs you used in one day? (1 point for >12)**

Level of Control Based on Composite Score

1-2 = not well controlled, 3-4 = very poorly controlled

Vollmer, et al. AJRCCM, 1999;160:1647.

Simple Rules of Thumb

- **Rules of Two®**
  - **one should be on maintenance asthma therapy if <u>any</u> of the following apply:**
    - **rescue inhaler use more than TWICE a week**
    - **nighttime symptoms more than TWICE a month**
    - **refill of rescue inhaler prescription TWICE a year**

®Baylor Health System

Components of Control		Classification of Asthma Control (Youths ≥12 years of age and adults)		
		Well-Controlled	Not Well-Controlled	Very Poorly Controlled
Impairment	Symptoms	≤2 days/week	>2 days/week	Throughout the day
	Nighttime awakening	≤2x/month	1–3x/week	≥4x/week
	Interference with normal activity	None	Some limitation	Extremely limited
	Short-acting $beta_2$-agonist use for symptom control (not prevention of EIB)	≤2 days/week	>2 days/week	Several times per day
	FEV_1 or peak flow	>80% predicted/ personal best	60–80% predicted/ personal best	<60% predicted/ personal best
	Validated Questionnaires ATAQ ACQ ACT	 0 ≤0.75* ≥20	 1–2 ≥1.5 16–19	 3–4 N/A ≤15
Risk	Exacerbations	0–1/year	≥2/year (see note)	
		Consider severity and interval since last exacerbation		
	Progressive loss of lung function	Evaluation requires long-term followup care		
	Treatment-related adverse effects	Medication side effects can vary in intensity from none to very troublesome and worrisome. The level of intensity does not correlate to specific levels of control but should be considered in the overall assessment of risk.		

NAEPP EPR–3 2007. NIH Item No. 08–4051 http://www.nhlbi.nih.gov/guidelines/asthma/index.htm. Accessed February 12, 2007.

Case follow-up

- Prescribed medium dose inhaled fluticasone with spacer
- Returns 6 weeks later
- Feels asthma is “better but not great”
- Back to running & aerobics still with albuterol 4-6 puffs max/day
- Nocturnal awakenings 2-3 times/month

ATAQ Questionnaire for case

1. In the past 4 weeks did you miss any work, school, or normal activities due to your asthma? (0 points)
2. In the past 4 weeks, did you wake up at night because of your asthma? (1 point)
3. Do you believe your asthma was well controlled in the past 4 weeks? (1 points)
4. Do you use an inhaler for quick relief of asthma symptoms? If yes, in the past 4 weeks, what was the highest number of puffs you used in one day? (0 points)

ATAQ 2/4 not well controlled

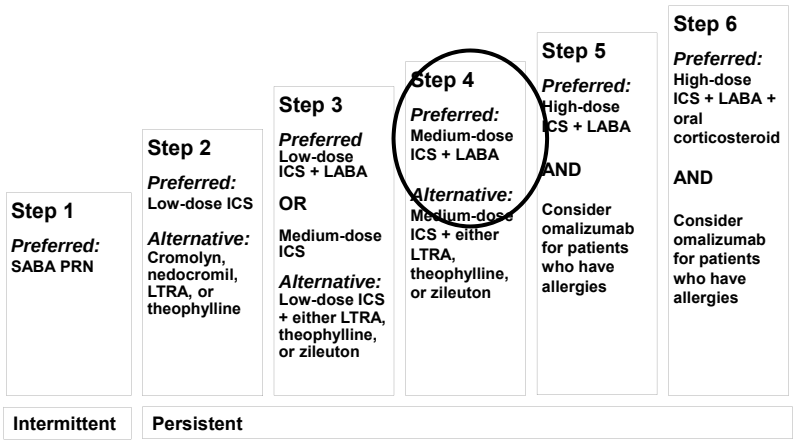
Level of Control Based on Composite Score

1-2 = not well controlled, 3-4 = very poorly controlled

Vollmer, et al. AJRCCM, 1999;160:1647.

What would you do next for this patient?

Stepwise Approach for Managing Asthma in Youths ≥12 Years of Age and Adults



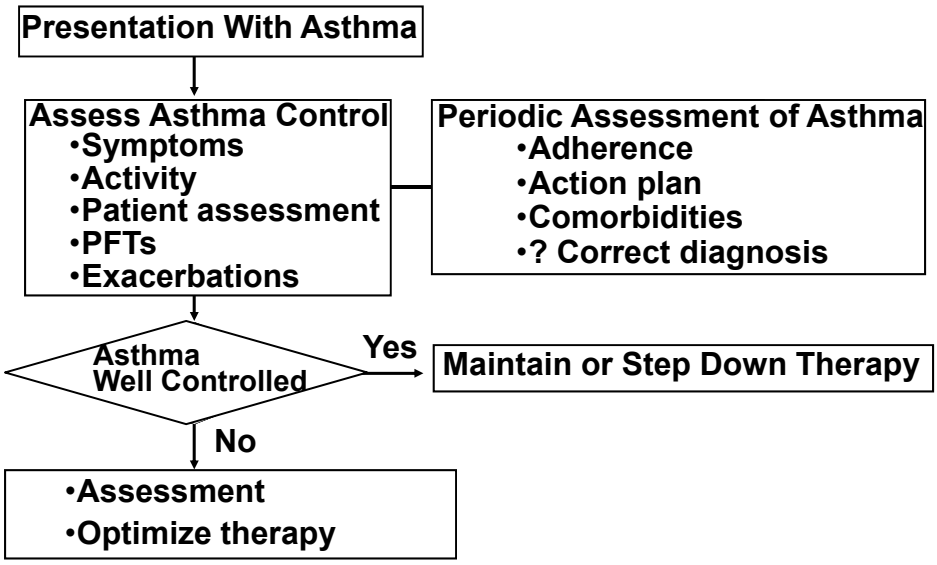
NAEPP EPR–3 2007. NIH Item No. 08–4051. Available at: http://www.nhlbi.nih.gov/guidelines/asthma/asthgdln.htm. Accessed February 12, 2007.

ICS vs ICS + LABA

- **"Studies of adults in whom the dose of ICS was at least doubled demonstrate some improvements in lung function…although these results are generally less effective than adding a LABA (Ind et al. 2003)."**

NAEPP EPR–3 2007. NIH Item No. 08–4051
http://www.nhlbi.nih.gov/guidelines/asthma/index.htm. Accessed February 12, 2007.

Continuous Monitoring and Reevaluation Is Essential to Achieve Control



Adapted with permission from Li JT et al. *J Allergy Clin Immunol.* 2005;116(suppl):S5-S11).

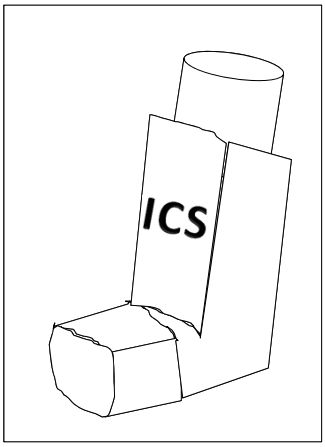
Conclusions

- Characterization of impairment & risk
  - Severity
  - Control
- Assessment of risk
  - Continuous & routine
  - Multiple methods

Asthma: Pediatric Nuances and Call to Action (Plans)

Elizabeth D. Allen, MD
Pediatric Pulmonary Medicine
Nationwide Children's Hospital

Case #1 – Inhaler Failure



- 12 yo with on low dose ICS therapy for asthma
- Presents for sore throat
- Asthma Control Test score is only 15 (<20 suggests poor control)

Case #1: More Detail

- **You started this 12 yo on low dose ICS 6 months ago**
- **He stopped having bad attacks, so family hasn't followed up**
- **But he's still having day to day symptoms**
- **Parent report (and pharmacy fill check) suggest good compliance, and they swear they use a spacer**

Why Do Asthma Therapies Fail?

- Compliance issues
- Ongoing "trigger" exposures
- Co-morbidities
- Wrong diagnosis
- Inadequate medication issues

Ongoing "Trigger" Issues

- Second hand (or first hand) smoke
- Allergens
  - Pets
  - Indoor mold/dust
  - Outdoor allergens
- General airway irritants
  - Perfumes, candles, cleaning agents . . .

Co-Morbidities

- Chronic sinus disease
- Obesity
- Gastroesophageal reflux
- Vocal Cord Dysfunction
- Obstructive Sleep Apnea (?)

Case #2: Further History

- No smokers, no pets
- No nasal drainage
- No heartburn or other GER like symptoms
- No snoring
- Not obese

Case #1: Not Asthma?

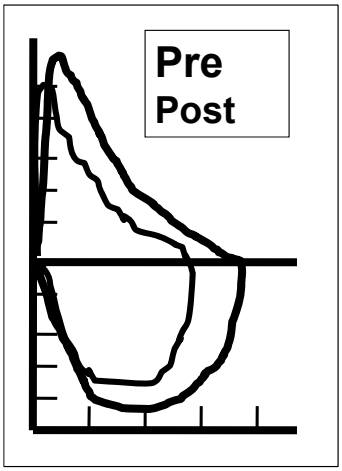
- **Still reports typical symptoms**
- **When he takes his albuterol, it helps**
- **Otherwise healthy**
- **Exam is normal**
- **Spirometry?**

Pulmonary Function Tests and Kids

- Obtaining quality spirometry tests prior to age 6 yrs is challenging!
- Most asthmatics develop symptoms prior to age 5 yrs
- "Well" asthmatics often have normal spirometry
- Minimally symptomatic patients may have very abnormal spirometry!

Case #1: Spirometry

FVC	82% pred
FEV1	69% pred
FEV1/FVC	75.7 %
FEF25-75	43 % pred



Change post albuterol

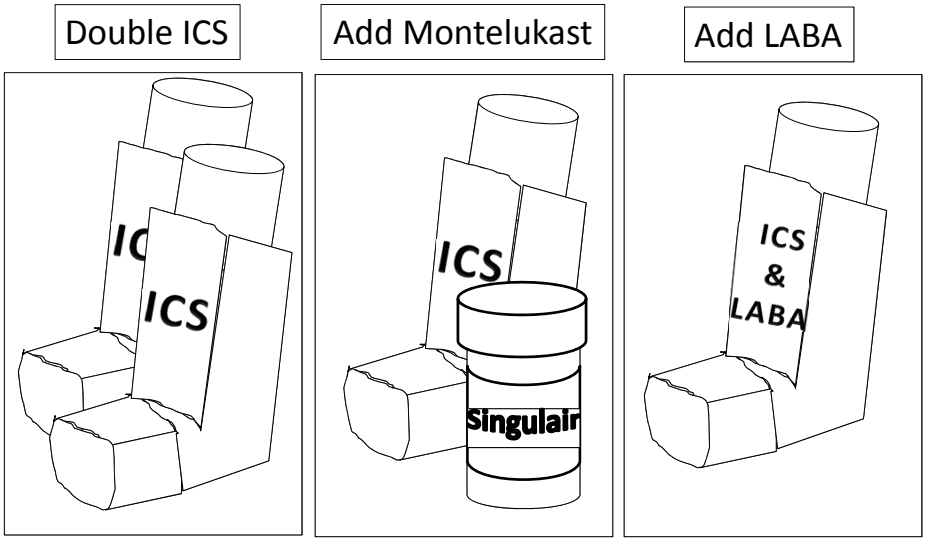
- FEV1 - 19% increase
- FEF 25-75 - 53% increase

Moderate Obstruction with (+) bronchodilator response

Case #1: What Next?

- Child's asthma is not controlled on current therapy (low dose ICS)
- Compliance & inhaler technique appear good
- Nothing to suggest ongoing major trigger or co-morbidity
- Symptom description and PFT's confirm asthma IS the problem
- Time to Step Up Therapy

Options for Stepping Up Therapy



Step-Up Therapy for Children . . .

- **N=182, 6-17 yo's, uncontrolled on 100 µg BID fluticasone**
- **Triple cross-over between:**
  - **250 µg fluticasone BID**
  - **100 µg fluticasone BID & leukotriene**
  - **100 µg fluticasone & 50 µg LABA BID**
- **Based on exacerbation & control score & FEV_1:**
  - **Added LABA most likely to produce best response**
  - **Some children, however, responded best to moderate dose ICS, or to ICS & leukotriene**

N Engl J Med 2010;362:975-85.

The LABA Controversy

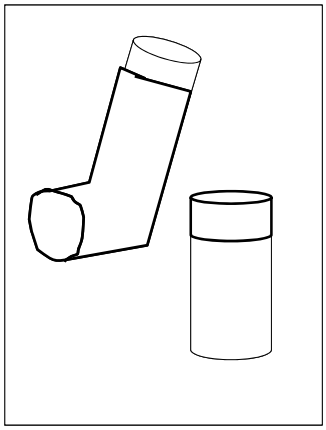
- LABA's used alone are a bad idea
- Used as intended (combined with ICS) there's been no clear signal of trouble
- Decision to use should factor in:
  - Higher ICS doses increase risk of side effects
  - Leukotrienes can (uncommonly) have behavioral side effects
  - Most LABA combinations are only FDA approval for ≥ 12 year olds

ICS Side Effects - Kids

- Mild side effects – low-medium dose
  - Thrush
  - Growth velocity decrease
    - Related to dose/weight
    - CAMP study found 400 mcg budesonide/day led to mean 1.2 cm decrease in adult height *
    - Effect occurred within first 2 years; not cumulative
- Serious side effects - rare, high doses
  - Adrenal suppression

*NEJM 2000;343:1054-1063

Balancing
Medication Risk and Asthma Risk



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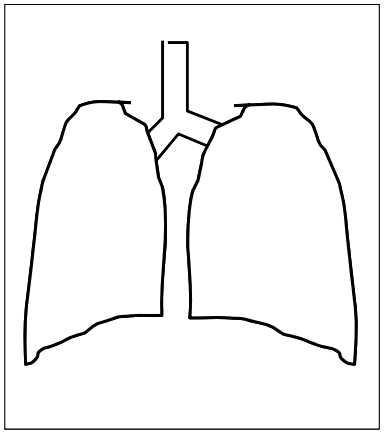
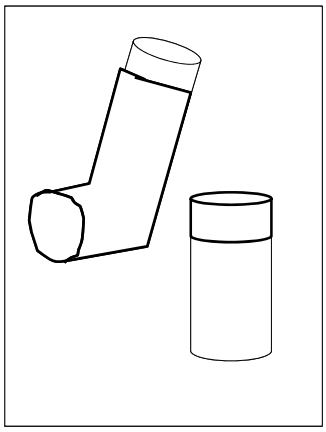


Balancing
Medication Risk and Asthma Risk



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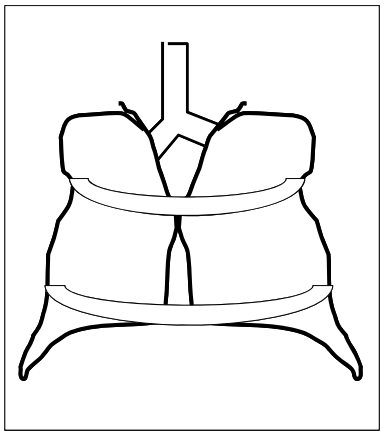


Stepping Up Therapy Recs

- In the pre-school set, first step-ups usually involve ↑ ICS dosing, or adding a leukotriene
- Consider LABA's as a first step up if:
  - Older child
  - Frequent low grade symptoms
  - Exercise intolerance
- Regardless, follow-up (6-8 weeks) needed to make sure change worked

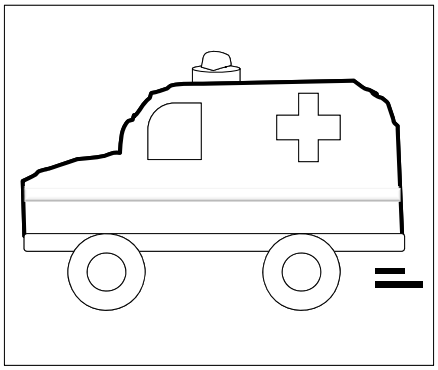
NHLBI 2007 EPR-3 Asthma Guidelines

Case #1: Conclusions

- Asthma therapy can fail for a variety of reasons
- Spirometry can sometimes uncover severity of asthma that is not suspected from history
- Stepping up from low dose ICS therapy can be done in a variety of ways: different approaches work better for different kids
- Recheck progress!

Case #2: Ambulance Again

- 6 yo with h/o asthma for 3 years, 2 previous hospital stays, multiple ED visits
- Presented in severe distress, O_2 sat 85%



Case #2: More Story

- **Mom reports**
  - **Runny nose began 3 days ago**
  - **Frequent coughing began 2 days ago**
  - **Last night wheezing started - albuterol nebs begun**
  - **This morning 3 back-to-backs didn't help . . .**
  - **Mom called 911!**
- **Now improving with aggressive inpatient therapy**

How does this scenario compare to what you *want* your parents/patients to do in response to an asthma event?

Asthma Mortality & Morbidity

- **Of 298 children admitted to PICU for status asthmaticus at Conneticut Children's Medical Center, 55% were classified pre admission as "mild asthma"**
- **Of 20 children who *died* of asthma in UK Eastern Region between 2001-2006, 9 had "mild to moderate" asthma**

*** J Asthma 2008: 45(6);513-7**
**** Prim Care Respir J 2012; 21(1);71-7**

Written Asthma Action Plans

- **Reduce acute asthma visits & hospitalizations**
- **Work well based on symptoms alone (for kids); can also include peak flow readings**
- **List control medication**
- **Advise SABA therapy for asthma symptoms**
- ***Indicate steps to take if albuterol isn't working***
- **Need to be reviewed regularly!**

Acute Asthma: What Parents Should Know

- **During acute flares, 3 things happen:**
  - **Smooth muscle constriction**
  - **Airway swelling**
  - **Mucus overproduction/plugging**
- **Albuterol ONLY helps the first issue!**
- **If albuterol is failing, oral steroids – quickly – are the next step in treatment**
- **Viral infection (esp rhinovirus!) is the most common cause of severe asthma attacks**

Acute Asthma: Reminders for Providers

- Home supply of oral steroids can be an important tool for educated patients
- Not helpful:
  - Antihistamines
  - Cough medications
  - Antibiotics (unless a bacterial infection is trigger)
  - Doubling ICS therapy

Case #2: Conclusions

- Good asthma care includes educating patients and families of even mild asthmatics about how to respond to acute flares
- Written plans help – and are standard of care
- Instruction regarding next steps if albuterol isn't working – especially during colds! – particularly important

AAP's on the Web

- **http://www.nhlbi.nih.gov/files/docs/public/lung/asthma_actplan.pdf**
- **http://www.lung.org/lung-disease/asthma/taking-control-of-asthma/AsthmaActionPlan-JUL2008-high-res.pdf**
- **https://www.aaaai.org/Aaaai/media/MediaLibrary/PDF%20Documents/Libraries/NEW-WEBSITE-LOGO-asthma-action-plan_HI.pdf**