

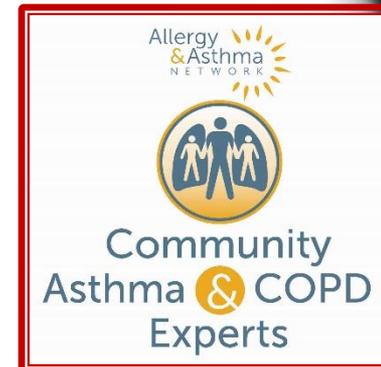
Building Your Mastery and Confidence in Dealing with Asthma



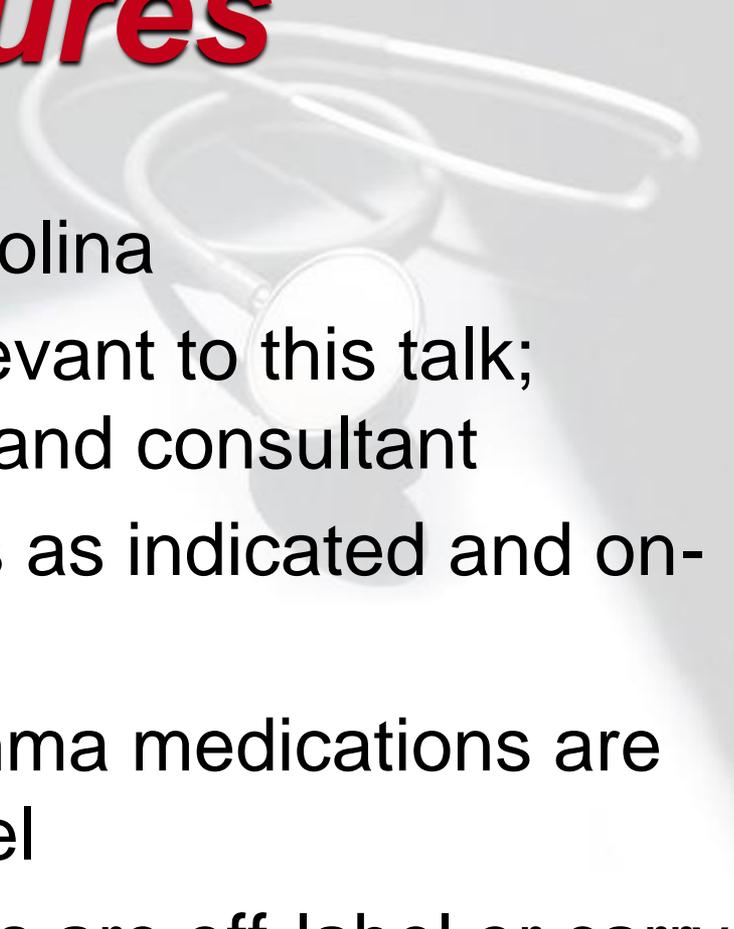
C. Michael Bowman, PhD, MD

*Pediatric Pulmonologist; Professor Emeritus
Medical University of South Carolina*

cmbowmansc@gmail.com



Disclosures



- Retired from Med Univ S Carolina
- No financial relationships relevant to this talk; Monaghan speakers bureau and consultant
- Will speak about medications as indicated and on-label
- Multiple commonly-used asthma medications are often used in children off-label
- Will identify when medications are off-label or carry FDA warnings

Learning Objectives

Members of the audience will be able to:

- Outline the pathobiology and clinical manifestations of asthma and the role of triggers;
- Describe current evidence-based approaches to asthma management and trigger reduction, including adjustments of therapy;
- Identify effective communication patterns for teaching patients, parents, caregivers;
- Identify patients with severe asthma and outline their special needs for therapy.

Introduction

Asthma Burden

- Asthma is the most common chronic disease and can be fatal; ~14M school & ~14M work days lost
- Seasonal up-ticks
- Effective control requires a team of caregivers which is hard to pay for. Prevention \$ < acute care \$\$\$
- There are marked disparities in asthma outcomes among minorities – ER, admissions, death.
- Multiple social factors make asthma more difficult to control – these **MUST** be recognized / addressed!
- Overall, asthma is estimated to cost over \$80 B/yr

Introduction, II

Why is this worth talking about?

- Key factors -- Fragmented care, using rescue only;
Wechsler et al. NEJM 2007;356:2083-2091
- Overall incidence was ~ 5% in 1980, ~9% now
- Hispanics: Puerto Rican > Mexican heritage;
- Native Americans: High incidence of smoking/ETS;
- Poverty worsens incidence and outcome;
- ANY asthma death should be considered an excess/avoidable death!
- “Asthma is a disease of communication as much as inflammation” – R Brown, MD, U Michigan

Guidelines

We're quite fortunate!

- Often, chronic illnesses have widely variant approaches to treatment
- Asthma is different – guidelines have existed since 1992 – providing research-based best practices
- American guidelines – the Expert Panel Report – have been revised intermittently (2007 – 2021)
- **G**lobal **I**nitiative for **A**sthma (GINA) Guidelines started in 1995 and get revised every year
- Remember that the FDA requires 2 American studies to make a recommendation for drug approval

Current Asthma Incidence

Nat'l Center for Environ Health, 2018

| Children (\leq 17 yo) | <u>2016</u> | <u>2018</u> |
|--|--------------|--------------|
| • All | 8.4% | 7.5% |
| • White, non-Hispanic | 6.7% | 6.8% |
| • Black, non-Hispanic | 15.4% | 14.2% |
| • Hispanic | 6.8% | 7.5%* |
| * Puerto Rican 13.6% , Mexican 6.6% | | |
| • Native American/Alaskan | 16.1% | 10.2% |
| • Asian | 4.0% | 3.8% |
| • Black/White bi-racial | 13.4% | 13.0% |
| • Poverty | 10.7% | 10.8% |
| • Not poor | 6.7% | 6.5% |

Asthma Under-world

Why is asthma still such a problem?

- **Under** – diagnosis
 - “It’s just another cold”
 - “He’s just shy” (exercise)
 - “You know she’s in daycare”
- **Under** – treatment
 - “The albuterol worked well”
 - “I don’t want him on so many drugs”
- **Under** – referral to asthma specialists
 - “It’s just her sinuses”
 - “The prednisone works really well”



What is Asthma? A Syndrome

Recurrent, reactive, airway obstructive disease

This means that the patient has to:

- Show appropriate symptoms **repeatedly**,
- **Respond** at some time to bronchodilator therapy,
- Show symptoms/evidence of airway **obstruction**
 - Wheeze
 - Cough
 - Shortness of breath / dyspnea
 - Spirometry \pm bronchodilator
- Patient must adhere to prescribed therapy and report response

The Asthma Syndrome

Asthma is not one single disorder, but is now considered a syndrome with multiple phenotypes and endotypes

- Symptoms may overlap but the pathology and molecular mechanisms may vary;
- The more detailed the understanding, the better the chance for effective individualized therapy;
- Genes + Exposures + management
- Phenotypes are the observed abnormalities
- Endotypes are the mechanisms causing symptoms

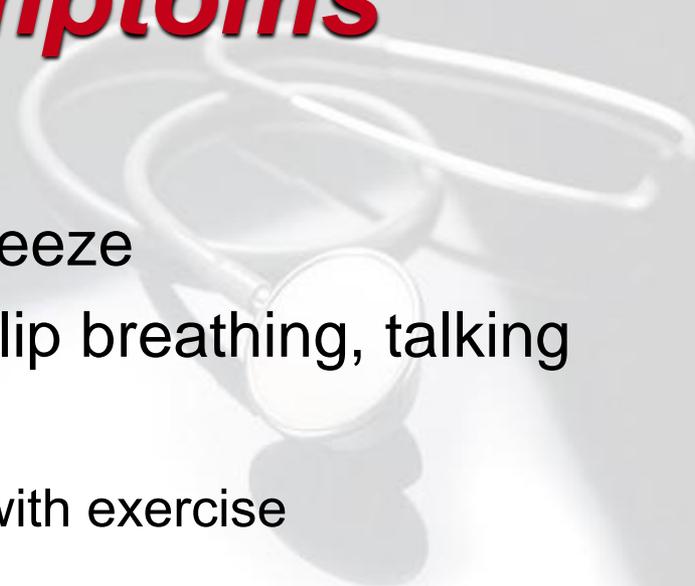
Asthma Pathophysiology

Phenotypes vs Endotypes

- An area of new and evolving understanding
- Endotype-mechanisms causing asthma expression
 - T2-high (eosinophilic) – different cells and mediators
 - Non-T2 (non-eosinophilic)
- Phenotype (clinical expression of the condition)
 - Eosinophilic – early atopic, late-onset, aspirin
 - Non-eosinophilic – non-atopic, smokers, obesity, elderly
- Complex biological mechanisms
- Personalized medicine – matching treatment to the specific mechanism; rapidly changing

Kuruvilla et al. Clin Rev All Imm (2019) 56:219-233

Asthma Symptoms



- Extrinsic (observable)
 - Noisy breathing – cough or wheeze
 - Respiratory distress, pursed – lip breathing, talking
 - Exercise intolerance
 - Won't play or symptoms appear with exercise
- Intrinsic (felt by the patient)
 - Chest tightness, can't breathe, can't get air out
 - Reduced comfort / enjoyment of exercise
- Physical examination (symptomatic at the time?)
 - Air flow is CRUCIAL (localized or general)
 - Cough, wheeze, hyperinflation, allergic manifestations
- Quite variable, can mimic a “cold”

The Key – Accurate Diagnosis

- History
 - Symptoms, occurrence, severity, exercise tolerance
 - Identify likely triggers and co-morbidities
- Physical examination (symptomatic at the time?)
 - Cough, wheeze, hyperinflation, allergic manifestations
- Laboratory studies
 - Spirometry, FeNO, allergy testing (blood or skin), IgE, eosinophils
- Response to therapy – previous, going forward
- Education – asthma, triggers, management
- Patient / family adherence

Asthma Mimics

- Must have careful history and exam
 - Symptoms, occurrence, severity, exercise tolerance
 - Has there ever been responsiveness to albuterol?
- Cough vs wheeze
- Common problems (acute, chronic)
 - Vocal cord dysfunction
 - Exercise intolerance
 - Aspiration (from above or below)
 - Hypersensitivity pneumonitis
 - Tracheo- / bronchomalacia or stenosis
 - Foreign body aspiration in acute setting



Asthma Severity

- The rule of 2's – symptom frequency
 - > 2 times a week or > 2 nights a month
 - Kids should exercise every day!
- Classify as intermittent vs. persistent
 - Intermittent needs only rescue medication
 - Most albuterol inhalers have 200 puffs!
 - Persistent (mild, moderate, severe) utilize controller / daily meds, increasing strength
- Assess severity only at the start of treatment!
- Assess risk based on history
- Assess control at every contact



Therapy is based on severity

- Classification by step in EPR-3/4 and GINA guidelines (intermittent vs persistent)
- Understand the bar graphs for step therapy
- Always use rescue, consider adding controller
- Treat 2 – 4 weeks, reevaluate, adjust Rx (up or down); education is crucial with every visit!
- Goals are to get excellent symptom control on minimum therapy; changes usually made every 1-4 months in follow-up
- Remove / minimize trigger impact; recognize seasonality, school; treat co-morbidities

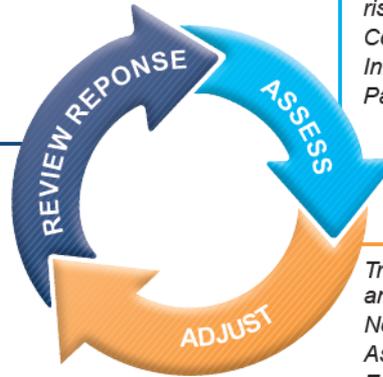
Therapy is based on severity

Box 3-5A

Adults & adolescents 12+ years

Personalized asthma management:
Assess, Adjust, Review response

Symptoms
Exacerbations
Side-effects
Lung function
Patient satisfaction



Confirmation of diagnosis if necessary
Symptom control & modifiable risk factors (including lung function)
Comorbidities
Inhaler technique & adherence
Patient preferences and goals

Treatment of modifiable risk factors and comorbidities
Non-pharmacological strategies
Asthma medications (adjust down or up)
Education & skills training

Asthma medication options:
Adjust treatment up and down for individual patient needs

PREFERRED CONTROLLER

to prevent exacerbations and control symptoms

Other controller options

PREFERRED RELIEVER

Other reliever option

| | STEP 1 | STEP 2 | STEP 3 | STEP 4 | STEP 5 |
|-----------------------------|--|---|--|--|---|
| PREFERRED CONTROLLER | As-needed low dose ICS-formoterol * | Daily low dose inhaled corticosteroid (ICS), or as-needed low dose ICS-formoterol * | Low dose ICS-LABA | Medium dose ICS-LABA | High dose ICS-LABA |
| Other controller options | Low dose ICS taken whenever SABA is taken † | Daily leukotriene receptor antagonist (LTRA), or low dose ICS taken whenever SABA taken † | Medium dose ICS, or low dose ICS+LTRA # | High dose ICS, add-on tiotropium, or add-on LTRA # | Refer for phenotypic assessment ± add-on therapy, e.g. tiotropium, anti-IgE, anti-IL5/5R, anti-IL4R |
| PREFERRED RELIEVER | As-needed low dose ICS-formoterol * | | As-needed low dose ICS-formoterol for patients prescribed maintenance and reliever therapy ‡ | | |
| Other reliever option | As-needed short-acting β_2 -agonist (SABA) | | | | |

* Data only with budesonide-formoterol (bud-form)

† Separate or combination ICS and SABA inhalers

‡ Low-dose ICS-form is the reliever only for patients prescribed bud-form or BDP-form maintenance and reliever therapy

Consider adding HDM SLIT for sensitized patients with allergic rhinitis and FEV1 >70% predicted

Co-morbidities

Conditions that can make asthma worse

- Allergic symptoms – “single airway concept”, asthma previously thought to be totally allergic
- GE reflux -- \pm aspiration, especially associated with night – time symptoms
- Obesity – vicious circle of exercise intolerance
- Tobacco Smoke (ETS) exposure – recognize in all settings of care
- Non-adherence – general feature of families, crucial to improve for all health and school success

Asthma Triggers

- Allergic – nose, skin, eyes, lungs
 - Assess the child and the home (and school)
 - Trees, pet dander, dust mites, mold, pollen, cockroaches
- Non-allergic / intrinsic – viral illnesses, aspiration, GE reflux, obesity
- Irritant – exhaust, smoke, scents
- Exercise – “exercise-induced bronchospasm” vs “asthma triggered by exercise”
- Kids should generally NOT get albuterol before recess or PE
- Full normal exercise / sports should be expected!

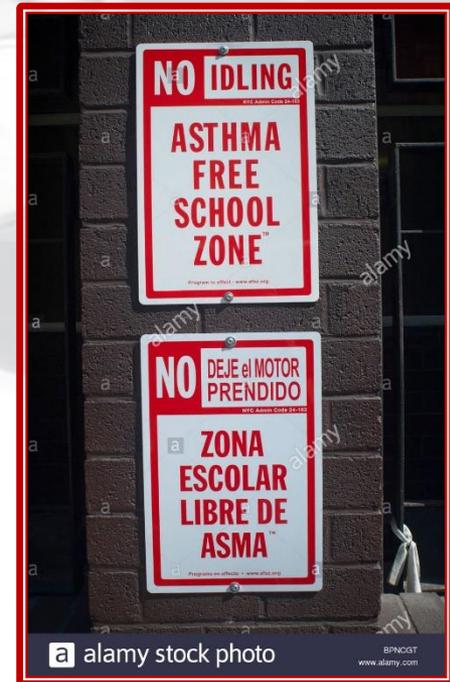
Asthma Triggers -- Recognition

A pair of white-rimmed glasses with round lenses is resting on a white surface. The glasses are slightly out of focus, and their shadow is cast on the surface below them.

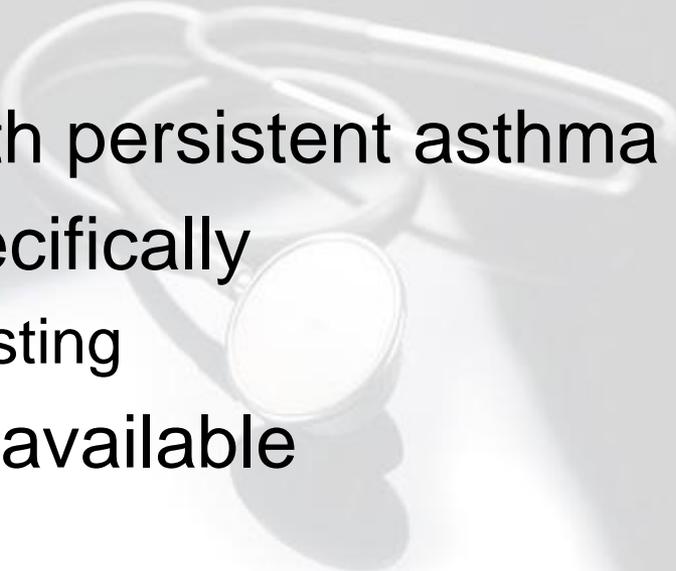
- History – when do symptoms appear or worsen?
 - Seasons, activities, locations, other symptoms
- Testing for allergen responses
 - IgE blood testing (total, specific)
 - Skin testing
 - Eosinophil levels
- Irritant exposures – do they affect the child?
- Exercise – what happens when they play hard?
Has albuterol reduced or prevented the symptoms?
- Colds – symptoms, duration, treatments given
- Nocturnal symptoms

Asthma Triggers

- Parental understanding – asthma is a modifiable disease; recognize future gains as being possible!
- Everyone has their own set of triggers which the prescriber needs to identify
- Many are environmental
 - Inhalants, allergens, smoke / fumes
- Others are intrinsic
 - GE reflux, aspiration, viral infection, exercise
- Reducing exposures are important
- Treatment works **WITH** trigger reduction



Allergic Recognition and Treatment

- Assessment, testing for all with persistent asthma
 - Avoidance – when known specifically
 - Skin testing, immunocap IgE testing
 - Immuno-therapy increasingly available
 - Significant symptoms
 - Major commitment by family
 - Treatment of upper airway disease symptoms
 - Role of consultant(s) – allergist vs pulmonologist
- 

Asthma Risk

- How likely is an adverse outcome?
- Based on history
- Higher risk suggests need for stronger treatment (and trigger reduction)
- Hospitalizations
- Intubations
- Steroid courses
- Prevention is key!
- Some patients can't perceive dyspnea



Influences on Asthma Outcomes

- Parental understanding – asthma is a modifiable disease; recognize future gains as possible!
- Treatments – effective, available
- Treatments in the patient – do the medications get in, device compliance?
- Pt / parent understanding – illness, treatment routine—NOT “just a cold”!
- Compliance – appointments, chronic treatments, acute care
- Patient supervision / age of self – care
- Caregivers often have not been to clinic



Asthma Control Assessment

- How have things been going?
 - Symptoms, exercise, sleep, PEFRs
- What medications have been used?
 - Controller adherence, need for rescue
- What exposures have occurred?
 - Season, viral illnesses, sports participation, inhalants, allergen exposures, *etc.*
- Utilize ACT for last month
- Increase meds if not doing well; decrease meds if doing well for > 3 months
- Reteach device usage



Asthma Control Test (ACT)

Childhood Asthma Control Test for children 4 to 11 years old.

Know the score.

This test will provide a score that may help your doctor determine if your child's asthma treatment plan is working or if it might be time for a change.

How to take the Childhood Asthma Control Test

Step 1 Let your child respond to the first four questions (1 to 4). If your child needs help reading or understanding the question, you may help, but let your child select the response. Complete the remaining three questions (5 to 7) on your own and without letting your child's response influence your answers. There are no right or wrong answers.

Step 2 Write the number of each answer in the score box provided.

Step 3 Add up each score box for the total.

Step 4 Take the test to the doctor to talk about your child's total score.

19 or less
If your child's score is 19 or less, it may be a sign that your child's asthma is not controlled as well as it could be. No matter what the score, bring this test to your doctor to talk about your child's results.

Have your child complete these questions.

1. How is your asthma today?

| | | | | |
|---|---|---|---|--------------------------|
|  |  |  |  | SCORE |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

2. How much of a problem is your asthma when you run, exercise or play sports?

| | | | | |
|---|---|---|---|--------------------------|
|  |  |  |  | SCORE |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

3. Do you cough because of your asthma?

| | | | | |
|---|---|---|---|--------------------------|
|  |  |  |  | SCORE |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

4. Do you wake up during the night because of your asthma?

| | | | | |
|---|---|---|---|--------------------------|
|  |  |  |  | SCORE |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

Please complete the following questions on your own.

5. During the last 4 weeks, on average, how many days per month did your child have any daytime asthma symptoms?

| | | | | | | |
|--|--|--|--|--|--|--------------------------|
|  |  |  |  |  |  | SCORE |
| <input type="checkbox"/> | <input type="checkbox"/> |

6. During the last 4 weeks, on average, how many days per month did your child wheeze during the day because of asthma?

| | | | | | | |
|---|---|---|---|---|---|--------------------------|
|  |  |  |  |  |  | SCORE |
| <input type="checkbox"/> | <input type="checkbox"/> |

7. During the last 4 weeks, on average, how many days per month did your child wake up during the night because of asthma?

| | | | | | | |
|---|---|---|---|---|---|--------------------------|
|  |  |  |  |  |  | SCORE |
| <input type="checkbox"/> | <input type="checkbox"/> |

Please turn this page over to see what your child's total score means.

FOR PATIENTS

Take the Asthma Control Test[®] (ACT) for people 12 yrs and older.
Know your score. Share your results with your doctor.

- Step 1 Write the number of each answer in the score box provided.
- Step 2 Add up each score box for your total.
- Step 3 Take the test to the doctor to talk about your score.

1. During the last 4 weeks, how much of the time do you wake up during the night because of asthma?

| | | | | | | |
|---|---|---|---|---|---|--------------------------|
|  |  |  |  |  |  | SCORE |
| <input type="checkbox"/> | <input type="checkbox"/> |

2. During the last 4 weeks, how often do you cough because of asthma?

| | | | | | | |
|---|---|---|---|---|---|--------------------------|
|  |  |  |  |  |  | SCORE |
| <input type="checkbox"/> | <input type="checkbox"/> |

3. During the last 4 weeks, how often do you wake up during the night because of asthma?

| | | | | | | |
|---|---|---|---|---|---|--------------------------|
|  |  |  |  |  |  | SCORE |
| <input type="checkbox"/> | <input type="checkbox"/> |

4. During the last 4 weeks, how often do you wake up during the day because of asthma?

| | | | | | | |
|---|---|---|---|---|---|--------------------------|
|  |  |  |  |  |  | SCORE |
| <input type="checkbox"/> | <input type="checkbox"/> |

5. How often do you wake up during the night because of asthma?

| | | | | | | |
|---|---|---|---|---|---|--------------------------|
|  |  |  |  |  |  | SCORE |
| <input type="checkbox"/> | <input type="checkbox"/> |

AMERICAN LUNG ASSOCIATION
ASTHMA

If your score is 19 or less, your asthma may not be controlled as well as it could be. Talk to your doctor.

FOR PHYSICIANS

The ACT is:

- Clinically validated for diagnosis and severity assessment
- Supported by the American Lung Association
- A self-administered, valid, objective assessment that can help physicians and patients understand the state of asthma. Website: www.aactest.com (Accessed 10/21/10)

© 2010 American Lung Association. All rights reserved. For more information, visit www.aactest.com.

4 – 11 yrs

≥ 12 yrs

Tobacco Effects

- Parental understanding – tobacco smoke (ETS) is an irritant, not an allergy. ALL environments need to be kept smoke – free (grandparents, alternate parent, *etc.*)
- 1-800-QUITNOW – quit lines
- Prenatal smoke exposure effects
- Having a smoking room in a house is like having a peeing section in a swimming pool!



Tobacco Control

- Smokers need to be totally away from the child with asthma; smoke outside, and never in the car (even if the child isn't there); changing clothes after smoking is nice, but take what you can get!
- It takes 3 hrs for the smoke from one cigarette to clear from a room.
- E-cigarette risk hasn't yet been defined
- Urge parents to quit as a New Year's resolution or a Christmas gift to the family (and themselves) – family support is crucial for success
- Quit lines 1-800-QUITNOW
- Pts ≥ 13 yrs need to take rescue when they go out!

Therapeutic Approach to Asthma

Education (disease, treatment) is the key

Be sure they understand!

Health Literacy Universal Precautions toolkit

Goals:

- Patient / family understanding
- Normal daily function
- Minimal symptoms, even with trigger exposure
- Minimal intrusion on pt / family function
- Minimal costs
- Minimal medication side - effects

Therapeutic Approach to Asthma

Needed actions:

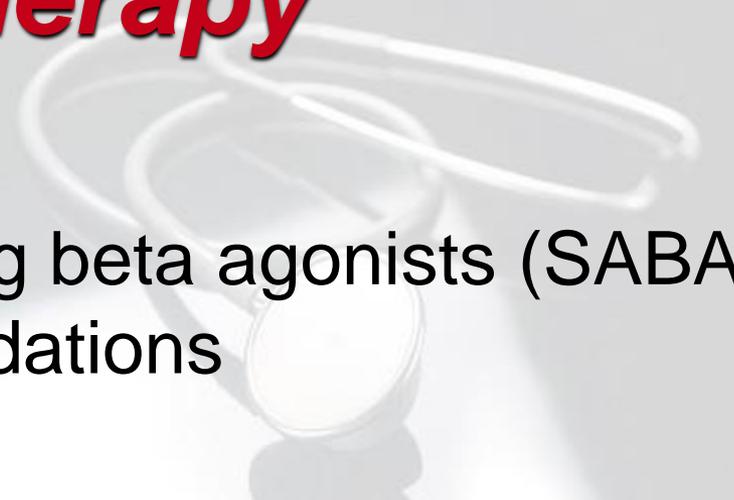
- Correct diagnosis and assessment
 - Severity & Triggers
- Effective education – patient / family
- Assemble the needed asthma team
- Appropriate chronic therapy, adjust as needed
- Reduce / eliminate trigger exposures / co-morbidities
- Appropriate response to acute symptoms (for all home caregivers!)
- Appropriate follow-up (don't ignore no-shows)

See 3 “yardstick” articles *Annals Allergy Asthma Immunol*

Gaining Asthma Control

- Make the correct diagnosis – not over- or under-diagnosis
- Assess severity (EPR 3&4, GINA annual guides)
- Assess triggers
- Educate
- Prescribe appropriate medications / environmental control; utilize asthma action plans (AAP)
- Enlist schools and other needed community resources for services
- Follow-up, assess control and adherence (including correct device usage)

Asthma Therapy



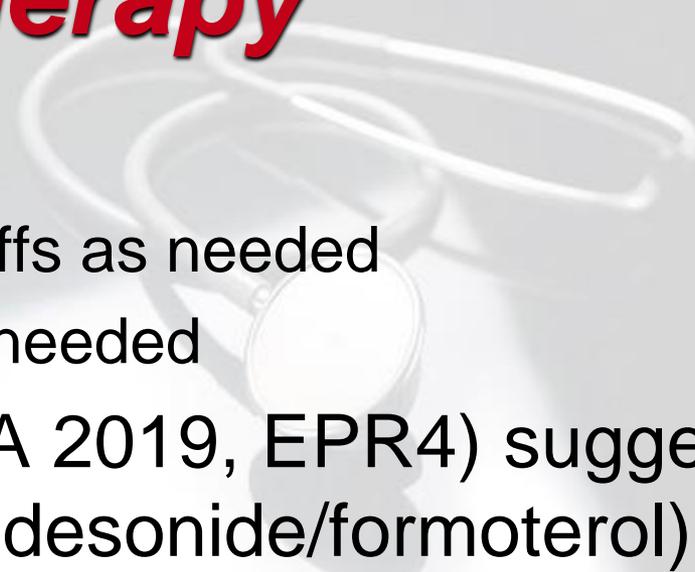
Relief / rescue:

- Bronchodilation – short-acting beta agonists (SABA) with new broader recommendations

Control medications:

- Anti-inflammatory, generally inhaled cortico-steroids (ICS)
- Combinations – ICS + long-acting beta agonist (LABA) – now also suggested for rescue
- Anti-cholinergics
- Anti-leukotrienes

Rescue Therapy

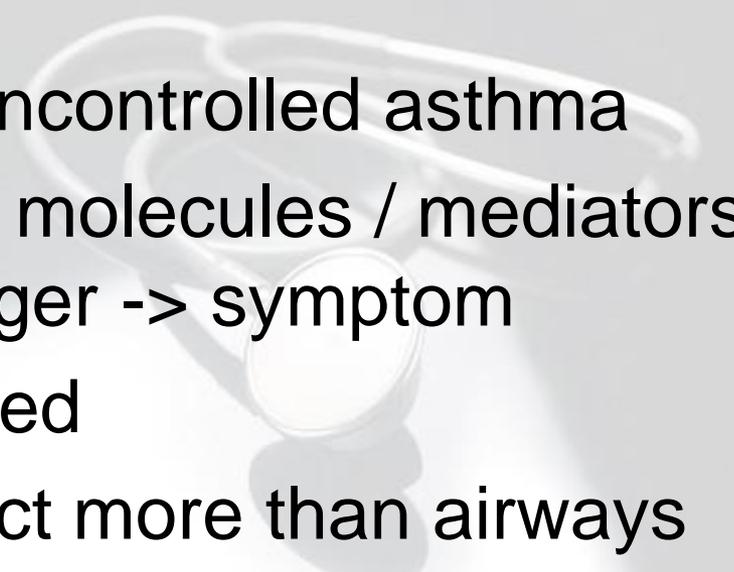


- Treat for symptoms
 - Most commonly, albuterol 2 puffs as needed
 - Problem is how often are they needed
- New recommendations (GINA 2019, EPR4) suggest use of combination drugs (budesonide/formoterol) for rescue at the start of a flare
- How quickly it is accepted scientifically and by payers in US is unknown
- Challenges classical asthma categorization

Controller Therapy -- Evolving

- Used for persistent asthma – daily medication
- Symptoms need to be severe +/- risky to warrant use of 7 – 14 treatments a week for months
- Remember that children should be able to play hard every day; many parents restrict them
- Most important feature is to convince the family / pt that they must take medicine even if they “aren’t sick”. Generally, controllers give no sensation. This expectation should be repeated frequently!
- Almost every study shows ~3 cannisters / yr used
- Strength of treatment – medication, dose, frequency

Biologics



- Considered only for severe uncontrolled asthma
- Monoclonal antibodies target molecules / mediators in the pathologic chain of trigger -> symptom
- All currently need to be injected
- Mediator molecules may affect more than airways
- Effectiveness depends on accurate categorization of the patient, dosing, trigger exposure
- Duration of need is currently unknown
- Coverage by payers may be problematic

McGregor MC et al Am Jour Resp Crit Care Med 2019; 199(4):433-445.

Devices in Asthma Therapy



Nebulizers:

- Used at home, often in Emergency Departments

Metered – dose inhalers (MDI):

- Controllers, rescue; generally used with spacers

Dry-powder inhalers (DPI):

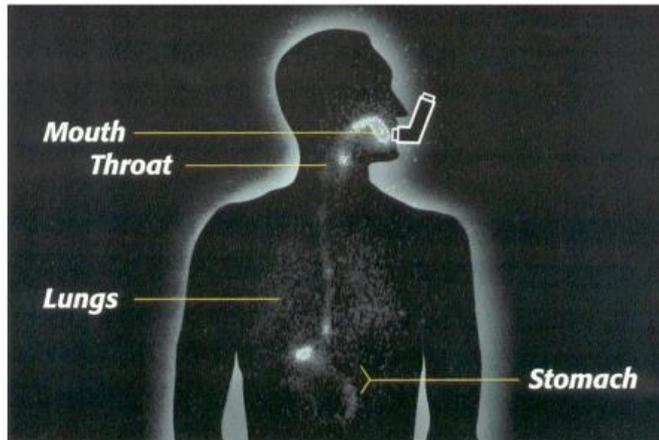
- ICS, combinations, rescue

Age and understanding are crucial!

- Pros, cons and cautions for each
- Self-carry permissions in schools

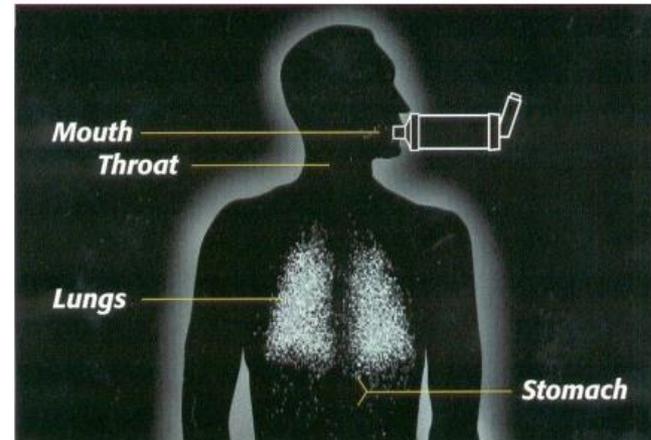
Technique MUST be taught & retaught!

Why use a **Spacer** with an Inhaler?



Inhaler alone

When an inhaler is used alone, medicine ends up in the mouth, throat, stomach and lungs.



Inhaler used with spacer device

When an inhaler is used with a spacer device, more medicine is delivered to the lungs.

“Comparative respiratory deposition of ^{99m}Tc labeled particles of albuterol using a metered dose inhaler, a metered dose inhaler with Aerochamber® spacer and OptiChamber® spacer in healthy human volunteers using gamma-scintigraphy,” R. Beihn, PhD, Scintiprox, Inc., Indianapolis, IN and D. Doherty, MD, Dept. of Pulmonology, University of Kentucky Medical Center, Lexington, KY, 1997.

Images kindly provided by Respironics HealthScan Inc.

Allies Against Asthma, Center for Pediatric Research, 855 W. Brambleton Ave., Norfolk, VA 23510, 757-668-6435

Effective use is age-, cooperation- and teaching-dependent!

Asthma Therapy Treatments 2021



Allergy & Asthma Network
2021
AllergyAsthmaNetwork.org
800.878.4403

Respiratory Treatments




SHORT-ACTING BETA₂-AGONIST BRONCHODILATORS
relieve tight, reactive airways and offer quick relief of symptoms such as coughing, wheezing and shortness of breath for 3-6 hours

| | | | | | |
|---|---|---|--|--|--|
| ProAir® Digihaler 117 mcg albuterol sulfate | ProAir® HFA 100 mcg albuterol sulfate | ProAir® RespiClick® 117 mcg albuterol sulfate inhalation powder | Proventil® HFA 128 mcg albuterol sulfate | Ventolin® HFA 90 mcg albuterol sulfate | Xopenex® HFA 50 mcg levalbuterol sulfate |
|---|---|---|--|--|--|

LONG-ACTING BETA₂-AGONIST BRONCHODILATORS
rescue in a way and offer lasting relief of symptoms such as coughing, wheezing and shortness of breath for at least 12 hours

| | |
|--|---|
| Serevent® Diskus 50 mcg salmeterol sulfate inhalation powder | Striverdi® Respimat® 2.5 mcg olodaterol hydrochloride |
|--|---|

INHALED CORTICOSTEROIDS
reduce and prevent swelling of airway tissues, they don't relieve sudden symptoms of coughing, wheezing or shortness of breath

| | | | | | | | | |
|--|---|---|---|---|--|--|---|---|
| Alvesco® HFA 83, 160 mcg ciclesonide | ArmonAir® RespiClick® 55, 113, 222 mcg fluticasone propionate inhalation powder | Amulya® Ellipta® 50, 100, 200 mcg fluticasone furoate inhalation powder | Amenex® HFA 180, 360 mcg mometasone furoate | Amenex® Twisthaler® 100, 200 mcg mometasone furoate inhalation powder | Flovent® Diskus® 50, 100, 250 mcg fluticasone propionate inhalation powder | Flovent® HFA 44, 110, 220 mcg fluticasone propionate | Pulmicort Flexhaler® 90, 180 mcg budesonide inhalation powder | QVAR® Redihaler™ 40, 80 mcg beclomethasone dipropionate |
|--|---|---|---|---|--|--|---|---|

COMBINATION MEDICATIONS
contain both inhaled corticosteroids and long-acting beta₂-agonists (LABA)

| | | | | | | | | | | | | |
|---|---|--|---|--|---|---|--|---|---|---|--|---|
| Advair Diskus® 100/50, 200/50, 300/50 mcg fluticasone propionate and salmeterol sulfate inhalation powder | Advair® HFA 40/21, 110/21, 220/21 mcg fluticasone propionate and salmeterol sulfate | Digihaler™ 55/14, 110/14, 220/14 mcg fluticasone propionate and salmeterol sulfate inhalation powder | AirDuo® RespiClick® 55/14, 110/14, 220/14 mcg fluticasone propionate and salmeterol sulfate inhalation powder | Breo® Ellipta® 100/25, 200/25 mcg fluticasone furoate and vilanterol inhalation powder | Dulera® 100/5, 300/5 mcg mometasone furoate and formoterol fumarate dihydrate | Symbicort® 80/45, 160/45 mcg budesonide and formoterol fumarate dihydrate | Wixelin™ Inhub™ 100/50, 200/50, 300/50 mcg fluticasone propionate and salmeterol sulfate inhalation powder | Anoro® Ellipta® 62.5/2.5 mcg amoxicillin and vilanterol inhalation powder | Bevespi Aerosphere® 84.5 mcg glycopyrronium bromide and formoterol fumarate dihydrate | Stiolto® Respimat® 2.5/25 mcg tiotropium bromide and olodaterol | Trelegy® Ellipta® 300/62.5/2.5 mcg, 100/62.5/2.5 mcg fluticasone furoate, amoxicillin and vilanterol inhalation powder | Bretri Aerosphere™ 100/4.5 mcg budesonide, glycopyrronium bromide and formoterol fumarate dihydrate |
|---|---|--|---|--|---|---|--|---|---|---|--|---|

MUSCARINIC ANTAGONIST (ANTICHOLINERGIC)
relieve cough, sputum production, wheezing and chest tightness associated with chronic lung disease

| | | | | |
|--|---|--|--|--|
| Atrovent® HFA 10 mcg ipratropium bromide | Long-acting Incore® Ellipta® 62.5 mcg aclazoniium inhalation powder | Spiriva® HandiHaler® 18 mcg tiotropium bromide inhalation powder | Spiriva® Respimat® 1.5, 2.5 mcg tiotropium bromide | Tudorza® Pressair® 400 mcg aclazoniium bromide inhalation powder |
|--|---|--|--|--|

COMBINATION MEDICATIONS
contain muscarinic antagonist and beta₂-agonist

| | |
|---|--|
| Short-acting Combivent® RespiMat® 20/10 mcg ipratropium bromide and albuterol | Long-acting Duaklir® Pressair® 400, 12 mcg aclazoniium bromide and formoterol fumarate dihydrate |
|---|--|

BIOLOGICS
target cells and pathways that cause airway inflammation, delivered by injection or IV

| | | | | |
|-----------------------------|----------------------------|------------------------------|----------------------------|---------------------------|
| Cinqair® mepolizumab | Dupixent® dupilumab | Fasenra® benralizumab | Nucala® mepolizumab | Xolair® omalizumab |
|-----------------------------|----------------------------|------------------------------|----------------------------|---------------------------|

BRONCHIAL THERMOPLASTY
A minimally invasive procedure that uses mild heat to reduce airway smooth muscle, leading to fewer and less severe asthma flare-ups, and days lost from activities. www.bronchoplasty.com



PDE4 INHIBITORS
reduce long-term airway inflammation and reduce asthma exacerbations

| |
|---|
| Delisep® 25, 50 mcg roflumilast |
|---|

Reviewed by Dennis Wilkins, PharmD ©2021 Allergy & Asthma Network

Use for EVERY patient to show devices and dose-counters! Distinguish rescue from controller devices!

Available from www.allergyasthmanetwork.com

Impact of Managed Care Formularies

- Every managed care plan has their own formulary for all of their drugs (including feds for Native Americans); these are based on contracts (\$\$)
- They can change quickly – age, medication, refills
- They generally follow FDA labeling, regardless of patient compliance (eg, DPI ages as low as 4)
- Changes lead to surprises for patients which often come at the pharmacy with high costs if not covered – always a risk for medication discontinuation
- Try to establish a relationship with the pharmacy manager for each plan you deal with

Asthma Action Plans (AAP)

- Instructions for managing asthma in all settings
 - Daily medications
 - Emergency medications, admin related to speed of deterioration of symptoms
 - “Take 2 puffs” vs “call EMS”, and everything in between
- Prescriber contact information, 24 hrs/d
- Everyone caring for the patient needs this
 - Many haven’t been to clinic & don’t know inhalers
- Many templates, most colored like stop lights
- **MUST** be understandable to everyone
- Essential for school settings

Asthma Action Plans

SAMPRO

 American Academy of
Allergy Asthma & Immunology

Asthma Action Plan for Home & School

Name: _____ Birthdate: _____

Asthma Severity: Intermittent Mild Persistent Moderate Persistent Severe Persistent
 He/ she has had many or severe asthma attacks/ exacerbations

Green Zone Have the child take these medicines every day, even when the child feels well.

Always use a spacer with inhalers as directed.

Controller Medicine(s): _____

Controller Medicine(s) Given in School: _____

Rescue Medicine: Albuterol/ Levalbuterol _____ puffs every four hours as needed

Exercise Medicine: Albuterol/ Levalbuterol _____ puffs 15 minutes before activity as needed

Yellow Zone Begin the sick treatment plan if the child has a cough, wheeze, shortness of breath, or tight chest. Have the child take all of these medicines when sick.

Rescue Medicine: Albuterol/ Levalbuterol _____ puffs every 4 hours as needed

Controller Medicine(s): _____

Continue Green Zone medicines: _____

Add: _____

Change: _____

If the child is in the yellow zone more than 24 hours or is getting worse, follow red zone and call the doctor right away!

Red Zone If breathing is hard and fast, ribs sticking out, trouble walking, talking, or sleeping.
Get Help Now

Take rescue medicine(s) now

Rescue Medicine: Albuterol/ Levalbuterol _____ puffs every _____

Take: _____

If the child is not better right away, call 911
Please call the doctor any time the child is in the red zone.

Asthma Triggers: (List) _____

School Staff: Follow the Yellow and Red Zone plans for rescue medicines according to asthma symptoms. Unless otherwise noted, the only controllers to be administered in school are those listed as "given in school" in the green zone.

Both the asthma provider and the parent feel that the child may carry and self-administer their inhalers
 School nurse agrees with student self-administering the inhalers

| | |
|---|----------------------------------|
| Asthma Provider Printed Name and Contact Information: _____ | Asthma Provider Signature: _____ |
| _____ | Date: _____ |

Parent/ Guardian: I give written authorization for the medications listed in the action plan to be administered in school by the nurse or other school members as appropriate. I consent to communication between the prescribing health care provider/ clinic, the school nurse, the school medical advisor and school-based health clinic providers necessary for asthma management and administration of this medication.

| | |
|-----------------------------------|------------------------------|
| Parent/ guardian signature: _____ | School Nurse Reviewed: _____ |
| Date: _____ | Date: _____ |

Please send a signed copy back to the provider listed above.

Adherence With Therapy

The BEST medication can't help if it isn't given!

- Rescue medications given as needed (rarely pre-exercise); usually with some sensation / relief
- Controllers given every day (BID or QD) regardless of symptoms; there's often no feeling by patient
- Almost all devices have dose-counters – must teach pts / families to **USE THEM!**
- Must always assess adherence before changing medications – follow documented refills, not history
- Must be concerned about too many rescue and too few controller refills
- EPR-4 suggests FeNO is not helpful here

Markers of Effective Asthma Control

What should we and our patients / families expect?

- Rare use of rescue medications
- Full, normal activity – no lung limitations
- No hospitalizations
- ≤ 2 courses of prednisone per year
- ≤ 2 albuterol treatments per week (unless URI)
- ≤ 2 nights per month with respiratory symptoms
- Successful amelioration of trigger exposures
- Brief viral illnesses (≤ 5 d vs > 2 weeks)
- Control of any co-morbidities
- Normal spirometry, no bronchodilator response

Pulmonary Function Testing (PFTs)

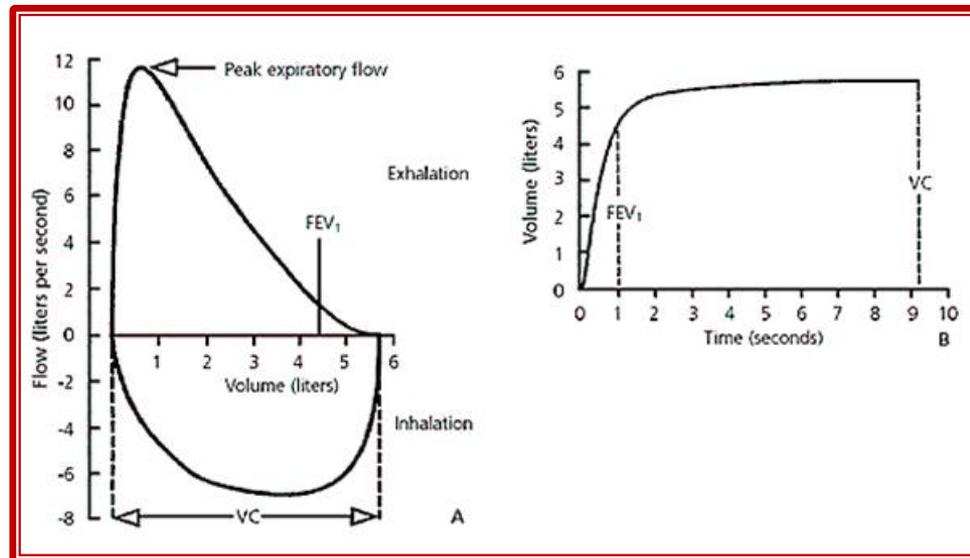
Spirometry

- Goal: objectively measure air flow rates and volumes by breathing into a device
- Valuable to assess all types of lung disease
- Age, understanding, cooperation
- Air flow rate is a marker of airway diameter; exhaled volumes show lung “size”
- Standards based on sex, race, height (% pred vs #)
- Exhalation maneuver is crucial for accuracy – total effort, repeatedly – interpretation requires graph
- Air leaving the lungs comes first from the large airways, then medium, then small.

Pulmonary Function Testing (PFTs)

Spirometry – flows and volumes

- FEV_1 = Forced Expiratory Volume in 1 second
- FVC = Forced Vital Capacity – all the air you can blow out from maximal inhalation
- PEFR = Peak Expiratory Flow Rate
- FEV_1 / FVC = how much of your air can you exhale in 1 sec?



Pulmonary Function Testing (PFTs)

Responses to bronchodilators and exercise

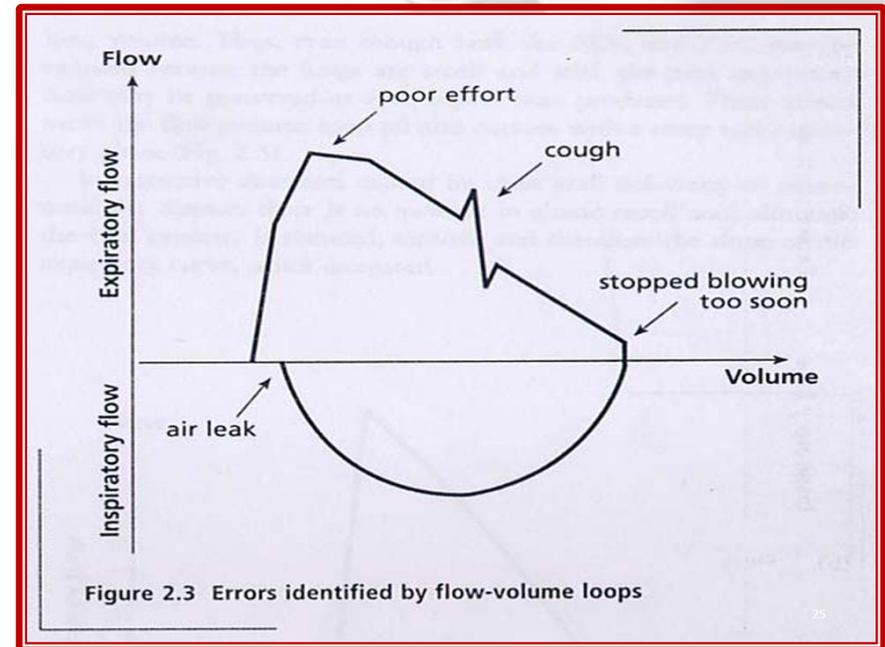
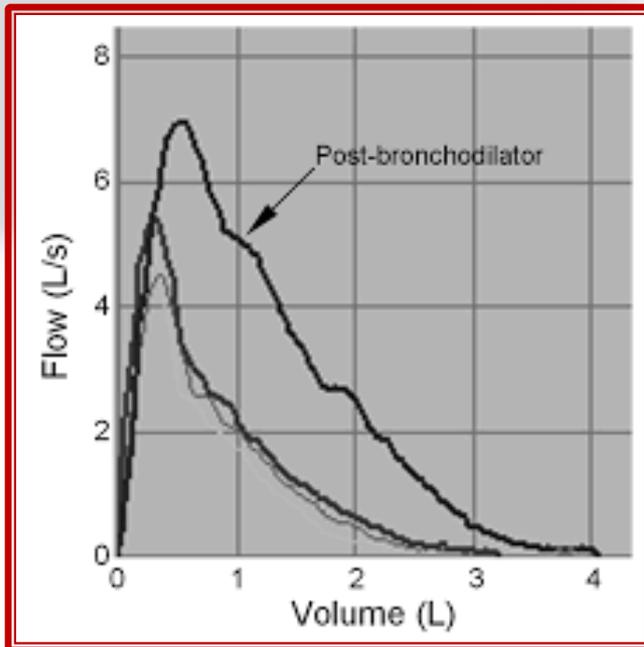
- Measuring airway opening or closing
- Perform baseline spirometry, then inhale standard albuterol and repeat spirometry
- A + bronchodilator response is $\geq 12\%$
- Measures degree of airway constriction
- Hand-held portable spirometer, usually PEFr, although FEV₁ is preferable – check “on site” values
- VERY important assessment for exercise intolerance
- It's also possible to do a more formal exercise tolerance test in the PFT lab to look for a decrease in FEV₁ with measured exercise or as a response to specific or general trigger inhalation



Pulmonary Function Testing (PFTs)

Flow-volume loops and percent predicted values

- Report data depends on the device used
- Percent predicted values compared to standards



Asthma and Exercise

What should we and our patients / families expect?

- Rare use of rescue medications for exercise
- Full, normal activity – no lung limitations/symptoms
- Activity does not directly equal sports participation
- If exercise triggers bronchospasm, it is a VERY uncomfortable situation – child doesn't know others can play without that feeling
- Key is to encourage participation for fun
- Many star athletes have asthma (eg, Michael Phelps, David Beckham, Jackie Joyner Kersey, Von Miller) – always have a list handy!

Dealing With Asthma Flares

What should we and our patients / families expect?

- Rare use of rescue medications
- What are the key symptoms in this patient?
- All caregivers **MUST** know how to respond (need AAPs for all care settings)
- Key determination: What triggered the flare?
- Give albuterol, watch closely for improvement
- GINA guidelines say to use budesonide/formoterol
- Repeat treatment when symptoms reappear
- Call MD or EMS if symptoms worsen

Home Visitation

- Multiple potential issues that families may not describe, or even recognize
- Understanding the family's condition provides great insight for caregivers – compliance, triggers, chaos
- Families often wary of visitors
- Multiple home visitation programs exist (see <https://mchb.hrsa.gov/node/50>)
- Use of Community Health Workers (CHW) can be very helpful (see www:FamiliesUSA.org)
- Minimum can be a Skype call with the family showing their home, medication area, *etc.*

Barriers to Effective Asthma Control

- Incorrect diagnosis of disease and triggers
- Poor education / understanding of disease
- Poor understanding of use of medications
- Access to guide-lines – driven care – by providers, payers, pharmacies
- Inner-city life, poverty, fragmentation of care (not hopeless, but families do need coaching/assistance)
- Limited health literacy / understanding
 - Must know that asthma can be modified by their action
 - Spoken language does NOT mean literacy / understanding
- Lack of follow-up – multiple situations

Asthma Not Under Control

Recognition

- Frequent symptoms and rescue medication use (remember albuterol inhalers have 200 puffs)
- Poor exercise tolerance (should play every day)
- Hospitalizations for asthma
- Multiple courses of prednisone per year
- Medication side effects
- Prolonged viral illnesses
- Abnormal spirometry with persisting bronchodilator response
- Increased regular follow – up needed

Hard to Control Asthma

- What makes asthma hard to control?
 - Non-adherence to treatment plan
 - Persistence of triggers, others not yet identified
 - Confusion over treatment plan (multiple providers)
 - Inability of patient to perceive dyspnea
 - Incorrect diagnosis
 - Insufficient medications prescribed or not picked up
 - Poor medication technique
- Each patient has a different cause
- Always assess accurately medication use prior to changing medications (dose or medication)

Severe Asthma

- Asthma w/ frequent flares, life – threatening
- Poor symptom control, quality of life
- Patient should be followed by asthma specialist; consider remote monitoring (evolving options)
- Patient / family is adherent to treatment plan, but still has frequent and severe symptoms
- Must go beyond “normal” asthma treatment and seek unrecognized / persisting triggers
- What does the patient / family recognize and worry about?
- Remember that asthma deaths come from all severity classifications

GINA Guideline Changes



2019

- Use ICS/LABA for rescue treatment

Redded HK *et al.* Eur Respir J 2019;53:1901046

2020

- Includes Covid-19 information/recommendations

<https://GINAsthma.org>

EPR4 Guideline Changes

EPR3 2007 (guidelines started in 1992 Q 5 yrs)

“EPR4” 2020

- 6 questions to be addressed – 4 revisions and 2 new topics; implementation guidelines included (new)
- Data gathering only up to Nov, 2018 – biologics not included
- Assessments of Indoor allergen mitigation; Intermittent ICS use; Immunotherapy; FeNO; LAMA use; Bronchial thermoplasty

Cloutier M *et al* JACI 2020; 145 (6):1207-1270

Several other relevant articles/editorials nearby

Learning Objectives

Members of the audience will be able to:

- Outline the pathobiology and clinical manifestations of asthma and the role of triggers;
- Describe current evidence-based approaches to asthma management and trigger reduction, including adjustments of therapy;
- Identify effective communication patterns for teaching patients, parents, caregivers;
- Identify patients with severe asthma and outline their special needs for therapy.

DID WE ACHIEVE THEM?

Disclaimer re: NAECEB Exam

- This talk is intended to help members of the audience with diverse experiences and work settings improve their asthma care. It should also help one prepare for the asthma educator certification exam; however, it is focused on excellent asthma care. It is NOT “teaching to the exam”.
- Those planning to take the exam should utilize other resources focused specifically on the NAECEB exam such as the self-evaluation test.
- There are multiple changes in asthma care being discussed right now. It is unclear how and when those changes will appear on the exam.

General References

- AHRQ: Health Literacy Universal Precautions Toolkit: https://www.ahrq.gov/sites/default/files/publications/files/healthlittoolkit2_3.pdf
- Asthma statistics: Summary Health Statistics: National Health Interview Survey 2016: https://ftp.cdc.gov/pub/Health_Statistics/NCHS/NHIS/SHS/2016_SHS_Table_C-1.pdf
- Brondolo E *et al.* Stress and Health Disparities. 2018; www.apa.org/pi/health-disparities/resources/stress-report.pdf
- CDC Asthma Surveillance Data: <https://www.cdc.gov/asthma/asthmadata.htm>
- CDC national asthma program “Breathing Easier”:
https://www.cdc.gov/asthma/pdfs/breathing_easier_brochure.pdf
- Chin MH *et al.* Health Care Quality-Improvement Approaches to Reducing Child Health Disparities. *Pediatrics* 2009;124:S224-236,
- Chipps *et al* – 3 “yardstick” articles in *Ann Allergy Asthma Immunol* 2016-19
- Cloutier MM *et al.* The 2020 Focused Updates to the Asthma Management Guidelines: A Report from the National Asthma Education and Prevention Program Coordinating Committee Expert Panel Working Group was coordinated and supported by the National Heart, Lung, and Blood. *JACI* 2020; 146 (6):1217-1270.

References II

- Davidson E *et al.* The impact of ethnicity on asthma care. *Primary Care Respiratory Journal* 2010;19: 202-208.
- Drake KA *et al.* Race, Ethnicity and Social Class and the Complex Etiologies of Asthma. *Pharmacogenetics* 2008;9:453-462.
- EPR-4:<https://www-clinicalkey-com.ezproxy-v.musc.edu/#!/content/journal/1-s2.0-S0091674920314044> (direct link)
- Kuruvilla M *et al.* Understanding Asthma Phenotypes, Endotypes and Mechanisms of Disease. *Clin Rev All Imm* 2019;56:219-233
- McGregor MC *et al.* Role of Biologics in Asthma. *AJRCCM* 2019; 199:433-445
- Qato D *et al.* “Pharmacy Deserts” Are Prevalent in Chicago’s Predominantly Minority Communities, Raising Medication Access Concerns. *Health Affairs* 2014;33:1958-1965.
- Sheats KJ. Mission Possible: Too Heavy a Burden: Thoughts on the Impact of Violence Disparities Experience by African Americans. CDC 2018: Conversations on Equity
- SMHRT: Student Media-based Health Research Team, R Gupta, NW Peds
- Washington D *et al* *J Racial Ethnic Dispar* 2018;5:928-938
- Wechsler ME *et al.* *NEJM* 2007;356:2083. (How pts die of asthma in the 21st century!)

Relevant Websites

- AAE: www.asthmaeducators.org
- AAN: Allergy & Asthma Network: www.allergyasthmanetwork.org
- American Lung Association analysis of asthma coverage by Medicaid: www.lungs.org/asthma-care-coverage
- CDC asthma data: www.cdc.gov/asthma/most_recent_data.htm
- CDC Minority Health: www.cdc.gov/minorityhealth/index.html
- Expert Panel Report (EPR-3) 2007: nhlbi.nih.gov/guidelines/asthma/index.htm;
Exec Summary: nhlbi.nih.gov/guidelines/asthma/asthmsumm.htm.
- EPR-4 in draft form 2 -2020
- GINA '19 (**G**lobal **I**nitiative for **A**sthma) www.ginasthma.org
- Health literacy toolkit (2nd edit): <https://www.ahrq.gov/professionals/quality-patient-safety/quality-resources/tools/literacy-toolkit/index.html>
- HHS Disparities Action Plan.
<https://minorityhealth.hhs.gov/omh/browse.aspx?lvl=2&lvlid=10>
- President's Task Force on Environmental Health Risks and Safety Risks to Children – <https://ptfceh.niehs.nih.gov/>
- SAMPRO: www.aaaai.org/SAMPRO
- Science & Outcomes of Allergy & Asthma Research. SOAAR@northwestern.edu
- ww.healthypeople.gov/2020/topics-objectives/topic/social-determinants-of-health

Building Your Mastery and Confidence in Dealing with Asthma



For more information on the Allergy & Asthma
Network and the Community Asthma &
COPD Experts program, visit:
allergyasthmanetwork.org
or email Sally Schoessler at
sschoessler@allergyasthmanetwork.org

