Asthma Basics for Health Coaches

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Definition

- Chronic respiratory disease
 - Airway inflammation and swelling
 - Muscle constriction or "bronchospasm"
 - Mucus over-production
- Episodic and recurrent
 - Waxing and waning airflow obstruction
 - × Wheezing
 - × Shortness of breath
 - × Coughing
 - × Chest tightness
- Largely reversible





Prevalence • In 2009 – 8.2% or 24.6 million Americans \circ Children = 9.6% Poor children = 13.5%, African American children = 17.0% • Adults = 7.7% • Women = 9.7%, Poor = 10.6% \circ In 2001 – 7.3% or 20.3 million Americans • Persistent demographic differences in prevalence Rates disproportionately greater among: • Children Women • African Americans • Income below poverty line

Impact

• Poorly controlled asthma associated with increased:

- ER visits
- Hospitalizations
- Medical costs

• Estimated total costs to society (2007)

- Medical expenses = \$50.1 billion per year
- Loss of productivity = \$3.8 billion per year
- Premature death = \$2.1 billion per year



- Asthma may develop at any age
 - $\,\circ\,$ Diagnosed before age 7 in ~75% of cases
 - Onset less frequent in the elderly
 - Adolescents may experience a remission in childhood asthma symptoms around puberty with recurrence several years later

• Classic triad

- Wheezing high-pitched whistling sound, usually upon expiration
- Cough typically worse at night
- Shortness of breath, or difficulty breathing
- Chest tightness band-like constriction
 - Not "chest pain"



- Episodic symptoms
 - Come and go
 - Hours to days
 - Resolve spontaneously with removal of trigger or in response to anti-asthmatic medications
 - May remain asymptomatic for long periods of time

Triggers



• Exercise

- 5-15 minutes after a brief exertion or 15 minutes into prolonged exercise, resolves with rest over 30-60 minutes
- Different than exertional dyspnea begins shortly after the onset of exertion and resolves within 5 minutes of rest
- Cold air
- Allergen exposure dust, molds, cat/dog dander, cockroaches, pollens
- Irritant exposure smoke, fumes, weather changes, chemicals, dust
- Viral infections
- Aspirin unique to asthma (only 3-5%)

• Personal / Past Medical History

• Atopic diseases

- 🗴 Eczema, atopic dermatitis
- Seasonal allergic rhinitis and conjunctivitis
- × Hives, urticaria
- Childhood chronic cough, nocturnal cough in absence of respiratory infections, diagnosis of "chronic bronchitis"

• Family History

- Asthma
- Allergies

• May be completely normal (and often is)

Wheezing

- Widespread, high-pitched, musical
- Most common on expiration

Severe airflow obstruction

- Tachypnea
- Tachycardia
- Prolonged expiratory phase
- Tripod position
- Accessory muscle use
- Speaking in short sentences





Tripod Position



Accessory Muscle Use

• Other PE findings:

- Pale, swollen nasal lining ("boggy turbinates") suggests associated allergic rhinitis
- Nasal polyps (glistening, gray, mucoid masses within the nasal cavity) suggests aspirin sensitivity or chronic sinusitis
- Clubbing is **NOT** a feature of asthma
 - × Interstitial lung disease, lung cancer, cystic fibrosis















Clubbing

Pulmonary Function Testing

- Peak expiratory flow rate "Peak Flow"
 - Simple and inexpensive
 - Can be done routinely at home for monitoring
 - Brief, forceful exhalation
 - Results dependent on patient's effort and technique
 - Perform 3 times, highest is "personal best"
 - \circ "Normal" is 80-100% of personal best
 - >20% improvement 10 minutes after bronchodilator (albuterol) favors asthma diagnosis
 - Can compare personal best to age predicted
 - 🗴 Gender, age, height



Pulmonary Function Testing

Spirometry

- Distinguish between normal and abnormal lung function
- Categorize abnormalities into obstructive or restrictive patterns
- Characterize the severity of the abnormality
- Assess the reversibility of obstruction after bronchodilator administration
- Monitor obstructive airway diseases therapeutic response to treatment (asthma/COPD)

Spirometry

- Forced vital capacity FVC is total volume of air exhaled
- \circ Forced expiratory volume in 1 second FEV₁
- \circ Airflow obstruction = FEV₁/FVC ratio < 70%
- \circ Severity then categorized by reduction in FEV₁
 - Mild obstruction = 65-80%
 - Moderate obstruction = 50-65%
 - Severe obstruction = <50%</p>
 - × Very Severe obstruction = < 35%
- Acute reversibility if >12% increase in FEV₁ 10-15 minutes after albuterol
 - × >15% is indicative of asthma, especially if post is normal

Flow-volume curve variations



Flow-volume curves from (A) a healthy person or from patients with (B) severe obstruction (emphysema), (C) severe restriction from interstitial disease (radiation fibrosis), (D) upper airways obstruction (tracheal stenosis), and (E) poor effort.

UpToDate





Flow-volume curve patterns from unacceptable forced vital capacity maneuvers. Curve A (red) hesitating start; curve B (blue) submaximal blast (poor peak flow effort); curve C (green) excessive coughing at the beginning of the maneuver; curve D (orange) premature termination of effort.

UpToDate.



Bronchoprovocation Testing

• Methacholine challenge

- Provokes airflow obstruction using a stimulus known to elicit airway narrowing
 - × Asthmatics are more sensitive
 - Indicated in evaluation of atypical or isolated symptoms, especially unexplained chronic cough

Chest X-Rays



- Almost always normal
- New onset to exclude alternative diagnoses
 - Mediastinal mass, heart failure
- Severe or difficult to control asthma to detect comorbid conditions
 - Allergic bronchopulmonary aspergillosis, eosinophillic pneumonia, atelectasis due to mucus plugging

• Atypical features

 Fever, chronic purulent sputum production, localized wheezing, hemoptysis, weight loss, clubbing, inspiratory crackles, significant hypoxia, airflow obstruction that does not reverse with bronchodilators

Blood Tests

- None available to assess the presence/absence of asthma or gauge severity
- CBC with differential
 - Eosinophilia may be due to allergic asthma
 - Consider other diagnoses including parasitic infections or drug reactions
 - Significant anemia can cause dyspnea
 - Consider checking if unresponsive to asthma therapies
- Serum alpha-1 antitrypsin level is recommended to exclude emphysema due to deficiency in lifelong smokers

Allergy Testing

- Consider if history suggests allergens cause asthmatic symptoms
- Most common = dust mites, cat/dog dander, cockroaches, pollens, mold spores
- Food allergens rarely cause asthma symptoms
- Elevated total IgE may indicate underlying allergic disease
- Skin tests vs blood tests



Differential Diagnosis

- Nasal congestion, post-nasal drip, rhinosinusitis
- Post-viral cough
- ACE-Inhibitor induced cough
- COPD emphysema, chronic bronchitis
- Pertussis
- Bronchiolitis, bronchiectasis
- Cystic fibrosis
- Vocal cord dysfunction
- Pulmonary embolism
- Sarcoidosis
- Panic disorder
- Congestive heart failure
- Gastroesophageal reflux disease (GERD)



Treatment

- The National Asthma Education and Prevention Program (NAEPP): Expert Panel Report, 2007 Guidelines
 - Routine monitoring of symptoms and lung function
 - Patient education
 - Controlling environmental factors (triggers) and co-morbid conditions
 - Pharmacologic therapy



Goals

Reduce impairment

- Freedom from frequent or troublesome symptoms
- Minimal need (≤ 2 times per week) of rescue medications (albuterol)
- Optimization of lung function
- Maintenance of normal activity
 - × Work or school attendance, exercise
- Satisfaction with care

Reduce risk

- Prevention of recurrent exacerbations and need for ER/hospital care
- Prevention of reduced lung growth in children and loss of lung function in adults
- Optimization of pharmacotherapy with minimal or no adverse effects

Determine Severity

Patients ≥12 years of age

Determine Severity When Initiating Therapy

		Cla	ssification of Asthma Se	verity (≥12 years of a	rears of age)	
	Components of Severity	Intermittent	Persistent			
		Internittent	Mild	Moderate	Severe	
	Symptoms	≤2 days/week	>2 days/week but not daily	Daily	Throughout the day	
Ę.	Nighttime awakenings	≤2x/month	3-4x/month	>1x/week but not nightly	Often 7x/week	
al FEV,Æ	SABA ⁺ use for symptom control (not prevention of EIB [‡])	≤2 days/week	>2 days/week but not daily and not more than 1x on any day	Daily	Several times per day	
orme	Interference with normal activity	None	Minor limitation	Some limitation	Extremely limited	
airment (N	Lung function	 Normal FEV₁ between exacerbations EEV = 2007 	• FFU - 900/ pmdiated	• EEU - 6000 hut	• FEV _ 600/ pmdiated	
Impa		predicted	 FEV₁ >00% predicted 	<80% predicted		
		 FEV₁/FVC normal 	 FEV₁/FVC normal 	 FEV₁/FVC reduced 5% 	 FEV₁/FVC reduced >5% 	
	Exacerbations requiring	0-1/year	≥2/year			
Risk	oral systemic corticosteroids	Frequenc	Consider severity and inter y and severity may fluctuate over	val since last exacerbation time for patients in any sev	ation ny severity category	
			Relative annual risk of exacerba	ons may be related to FEV ₁		
Recommended Step for		Step 1	Step 2	Step 3	Step 4 or 5	
Se	Initiating Therapy ee bar chart on the following page		and consider short course of oral systemic corticosteroids		short course of corticosteroids	
for treatment steps In 2-6 wee		In 2-6 weeks,	s, evaluate level of asthma control that is achieved and adjust therapy accordingly.			

Assess Control

Once Control Is Achieved, Continue to Assess Control on an Ongoing Basis (every 1 to 6 months)

Components of Control		Classification of Asthma Control (≥12 years of age)					
		Well Controlled	Not Well Controlled	Very Poorly Controlled			
	Symptoms	≤2 days/week	>2 days/week	Throughout the day			
	Nighttime awakenings	≤2x/month	1-3x/week	≥4x/week			
-	Interference with normal activity	None	Some limitation	Extremely limited			
irmen	SABA use for symptom control (not prevention of EIB)	≤2 days/week	>2 days/week	Several times per day			
npa	FEV ₁ or peak flow	>80% predicted/personal best	60-80% predicted/personal best	<60% predicted/personal best			
E	Validated questionnaires: ATAQ [®] ACQ [®] ACT ¹	0 ≤0.75 [#] ≥20	1-2 ≥1.5 16-19	3-4 N/A ≤15			
Risk	Exacerbations requiring oral systemic corticosteroids	0-1/year	≥2/year				
		Consider severity and interval since last exacerbation					
	Progressive loss of lung function	Evaluation requires long-term follow-up care					
	Treatment-related adverse effects	Medication side effects can vary intensity does not correlate to specifi	/ in intensity from none to very troubleso c levels of control but should be conside	me and worrisome. The level of red in the overall assessment of risk.			

* Forced expiratory volume in 1 second/forced vital capacity ratio. Normal FEV₁/FVC ratio by age: 8-19 yr=85%; 20-39 yr=80%; 40-59 yr=75%; 60-80 yr=70%.

⁺ Short-acting inhaled beta₂-agonist.

* Exercise-induced bronchospasm.

§ Asthma Therapy Assessment Questionnaire®.

^{II} Asthma Control Questionnaire®.

[¶] Asthma Control Test[™]. **#** ACQ values of 0.76-1.4 are indeterminate

regarding well-controlled asthma.



New Guidelines, New Treatment Approach

AstraZeneca

Stepwise Approach to Treatment

Patients \geq 12 years of age

Take a Stepwise Treatment Approach Intermittent **Persistent Asthma: Daily Medication** Asthma Consult with asthma specialist if step 4 care or higher is required. Consider consultation at step 3. Step 6 Step 5 Preferred Step 4 Step up Preferred High-dose Step 3 if needed Preferred High-dose ICS + LABA +(first, check Step 2 Preferred Medium-dose ICS + LABA oral adherence. Step 1 ICS + LABA Preferred Low-dose corticosteroid AND environmental ICS + LABA§ Low-dose Preferred Alternative control, and AND Consider ICS[†] SABA* PRN OR Medium-dose comorbid omalizumab for Consider Alternative ICS + either conditions) Medium-dose ICS patients who omalizumab for Cromolyn, LTRA. Alternative have allergies Assess patients who LTRA[‡] theophylline, Low-dose ICS + control have allergies nedocromil. or or zileuton either LTRA. theophylline Step down theophylline, or if possible zileuton (and asthma is well controlled Patient Education, Environmental Control, and Management of Comorbidities at Each Step at least Consider subcutaneous allergen immunotherapy for patients who have allergic asthma at steps 2 through 4 3 months) **Ouick-Relief Medication for All Patients** SABA as needed for symptoms. Intensity of treatment depends on severity of symptoms; up to 3 treatments at 20-minute intervals as needed. Short course of oral systemic corticosteroids may be needed Use of SABA >2 days a week for symptom relief (not prevention of EIB^{II}) generally indicates inadequate control and

the need to step up treatment

* Short-acting inhaled beta,-agonist. + Inhaled corticosteroid. + Leukotriene receptor antagonist. \$ Long-acting inhaled beta,-agonist. | Exercise-induced bronchospasm.

Controller Medications

- Inhaled corticosteroids (ICS)
 - Anti-inflammatory, prevent symptoms from developing
 - × Qvar, Pulmicort, Flovent, Asmanex
- Long-Acting Beta Agonists (LABA)
 - Relax airway smooth muscle, alleviate bronchospasm
 Serevent, Foradil
- Combination Products ICS + LABA
 - × Advair, Symbicort
- Leukotriene receptor antagonists (LTRA)
 - Blocks leukotrienes, an underlying cause of allergies/asthma
 - × Singulair, Accolate

Inhaled Corticosteroids

- Preferred controller medications (first line)
- Usually given twice a day
- Inhalers may be used with a spacer to assure proper delivery of medicine to lungs
- Minimal systemic absorption
 - Majority of medicine goes straight to lungs
 - × Low chance of weight gain or growth suppression
- May take 4-7 days to notice an improvement in symptoms
- Takes 2-4 weeks to achieve full benefits
- Must rinse mouth out afterwards to prevent thrush







- Generic = beclomethasone
- Comes in 40 and 80 mcg/spray MDI inhaler
- 5-11 yo: 40-80 mcg inhaled bid
 - \circ Max = 160 mcg/day
- >12 yo: 40-320 mcg inhaled bid
 - \circ Max = 640 mcg/day
- Preferred on Medicaid and Sliding Scale



Pulmicort Respules



- Generic = budesonide
- Nebulizer solution
- Comes in 0.25, 0.5 and 1 mg/2 mL
- 1-8 yo: 0.25-0.5 mg/day divided qd-bid
 Max = 1 mg/day
- May be given once a day for convenience
- No Medicaid PA required for children under 6 yo





- Generic = budesonide
- Inhaler
- Comes in 90 and 180 mcg/actuation DPI
- 6-11 yo: 180-360 mcg inhaled bid
 Max = 720 mcg/day
- > 12 yo: 180-360 mcg inhaled bid
 - \circ Max = 1,440 mcg/day
- Best ICS for pregnancy (category B) and lactation (probably safe)



Flovent HFA



- Generic = fluticasone
- Comes in 44, 110 and 220 mcg/spray
- 4-11 yo: 44-88 mcg inhaled bid
 Max = 176 mcg/day
- > 12 yo: 88-440 mcg inhaled bid
 - \circ Max = 880 mcg/day
- Children 4-5 yo may use Flovent without Medicaid PA
- Also comes in diskus (rarely prescribed)



Asmanex Twisthaler



- Generic = mometasone
- Comes in 110 and 220 mcg/actuation DPI
- 4-11 yo: 110 mcg/day
 - \circ Max = 110 mcg/day
- >12 yo: 220-440 mcg/day divided qd-bid
 - \circ Max = 440 mcg/day
- May be given once a day for convenience



Advair Diskus



- Generic = fluticasone/salmeterol
- Comes in 100/50, 250/50 and 500/50 mcg/blister DPI
- 4-11 yo: 100/50 mcg inhaled bid
 - \circ Max = 100/50 mcg inhaled bid
- >12 yo: 100-500/50 mcg inhaled bid
 - \circ Max = 500/50 mcg inhaled bid
- Low (green), medium (yellow), high (red) strengths for easy step up and step down
- May be difficult to use diskus until 7-8 yo



Advair HFA



- Generic = fluticasone/salmeterol
- Comes in 45/21, 115/21 and 230/21 mcg/spray MDI
- >12 yo: 2 puffs twice a day
 - \circ Max = 460/42 mcg inhaled bid
- Low (green), medium (yellow), high (red) strengths for easy step up and step down



Symbicort



- Generic = budesonide/formoterol
- Comes in 80/4.5, 160/4.5 mcg/spray MDI
- > 12 yo: 2 puffs twice day
 - \circ Max = 640/18 mcg/spray
- Preferred with Sliding Scale
- Patients may feel improvement within 15 min







- Generic = mometasone/formoterol
- Comes in 100/5 and 200/5 mcg/spray MDI
- > 12 yo: 2 puffs twice day
 - Max = 800/20 mcg/spray
- Newer, likely more expensive



Singulair





- Comes in 4 mg granule packet, 4 and 5 mg chewables and 10 mg tablet
- 12-24 months: 4 mg po qpm (use granules)
- 2-5 yo: 4 mg po qpm (use granules or chewables)
- 6-14 yo: 5 mg po qpm (use chewables)
- > 15 yo: 10 mg po qpm (use tablet)
- Once a day oral medication for convenience
- Helps with concomitant allergies
- Does not provide as much control as ICS
- Will likely require PA

Name		Date of Birth	
Address		Emergency Contact/Phone	
Health Care Provider Name	52	Phone	Fax
Asthma Severity: DMild Intermittent	□Mild Persistent	Moderate Persistent	Severe Persistent
Asthma Triggers: □Colds □Exercise	⊡Animals ⊡Du	st ⊒Smoke ⊒Food	⊡Weather ⊡Other
If Feeling Well		Every Day Medicine	S.
Child feels good: • Breathing is good • No cough or wheeze • Can work / play • Sleeps all night	MEDICINE:	HOW MUCH:	WHEN TO TAKE IT:
Peak flow in this area: to	20 mir	nutes before exercise use	this medicine:
If Not Feeling Well	Take Every Day Medicines and (Add)these Rescue Medicines		
Child has <u>any</u> of these: • Cough • Wheeze • Tight chest	MEDICINE:	HOW MUCH:	WHEN TO TAKE IT:
Peak flow in this area: to	Call doctor if thes	se medicines are used m	ore than two days a week.
If Feeling Very Sick Get help from Doctor NOW!		Take These Medicin	es
Child has <u>any</u> of these: • Medicine is not helping • Breathing is hard and fast • Nose opens wide • Can't walk of talk well • Ribs show	MEDICINE:	HOW MUCH:	WHEN TO TAKE IT:
Peak flow below:	SEEK EMERGENCY Getting worse fast, hard breathing or h	(CARE or CALL 911 NOW if Hard to breathe, Can't tall has passed out	: Lips are bluish, (or cry because of
Health Care Provider Signature		Date	
Patient Signature		Date	

Asthma Action Plan

• <u>asthma.carolinashealthcare.org</u>



Carolinas HealthCare System



Primary Care Asthma Tools

Helping providers make clinical decisions at the point of care.

> Asthma Action Plan Generator
 > Shared Decision Making Toolkit
 > Implementation Resources



Controlling Triggers

- Identify and avoid if possible
- Home, work, school, day care
- <u>SMOKING CESSATION!!!</u>
- Dietary sulfites (used to prevent discoloration) 5%
 - Beer, wine, processed potatoes, dried fruit, sauerkraut, shrimp

Co-morbid conditions

 COPD, GERD, OSA, obesity, rhinitis/sinusitis, cystic fibrosis, depression/stress

Medications

- Non-selective beta-blockers, aspirin/NSAIDs
- Vaccinations
 - Influenza, Pneumococcal

Monitoring

- Proactive, preventative approach
- Routine follow-up every 1-6 months depending on severity
 - Signs and symptoms
 - Pulmonary function
 - Quality of life
 - Exacerbations
 - Adherence to treatment
 - Medication side effects
 - Satisfaction with care



Barriers to Treatment and Control

- Cost
- Prior authorizations
- Inconvenience
- Side effects
- Can't figure out how to use inhaler
- Patients often self-discontinue or reduce dose
- Poor understanding of controller vs reliever

Referral to Specialist

- Diagnosis is uncertain
- Asthma is difficult to control
- Patient has frequent exacerbations
- Pulmonology



- Alternative pulmonary disease is suspected
- Bronchoscopy or other pulmonary function testing needed
- Asthma/Allergy
 - Allergic triggers need further evaluation
 - Difficult to control nasal and ocular allergy symptoms

Case

- HPI: Pt Ms. Smith is a 24 yo AAF with a PMH significant for seasonal allergies c/o wheezing and chest tightness off and on for the past 2 months. Using brother's "puffer" 4-5 times a week.
- PMH: Seasonal allergic rhinitis, eczema as a child, used a nebulizer machine every time she was sick as a child
- ROS:
 - (+) nasal congestion, post-nasal drip, sneezing, cough, SOB
 - (-) fever, headache, dizziness, chest pain, nausea, vomiting, diarrhea, abdominal pain, urinary sx, muscle pain, joint pain
- PSH: Tonsillectomy at 6 years old
- FH: 2 older brothers have asthma, mother has asthma and allergies, father is a "heavy smoker" and has HTN
- SH: Single, works in retail at the mall, denies smoking/alcohol/elicit drug use
- Medications: Zyrtec during allergy season, multivitamin
- Allergies: Penicillin causes hives

Case

• **PE**:

- 150 lbs, 66 in, BP: 114/68, HR: 88, RR: 16, Temp: 98.2, Pulse Ox: 97% General: Well developed, well nourished in no acute distress. HEENT: normocephalic, atraumatic, PERRLA, EOMI, sclera white, conjunctiva pink. Tympanic membranes intact and pearly gray bilaterally. Nares patent with clear rhinorrhea and boggy turbinates. Pharynx with mucoid post-nasal drip and cobblestoning. Neck: without lymphadenopathy. Heart: regular rate and rhythm, no murmurs/rubs/gallops. Lungs: with diffuse expiratory wheezing and prolonged expiratory phase. Full and equal expansion. Good effort. No rales or rhonchi. Extremities: 2+ and symmetric distal pulses, no clubbing/cyanosis/edema. Adequate capillary refill.
- Laboratory: Spirometry reveals baseline FEV1/FVC ratio 66% and FEV1 68%, consistent with moderate obstruction; 18% improvement in FEV1 following 1 nebulizer treatment. CXR PA and Lateral negative, no acute cardiopulmonary process.

Case

• Assessment/Plan:

- Asthma, likely moderate persistent begin Qvar 80 2 puffs twice a day. Use albuterol HFA – 2 puffs every 4-6 hours as needed for wheezing, shortness of breath, coughing, or chest tightness. Take Prednisone – 50mg once a day for 5 days. Follow-up in 1 week, sooner if needed. Recommend flu vaccine in the fall.
- Allergic rhinitis discussed allergen avoidance and gave handout. Continue Zyrtec 10mg at bedtime and add Flonase – 2 sprays per nostril daily.

References

- The National Asthma Education and Prevention Program: Expert Panel Report 3, Guidelines for the Diagnosis and Management of Asthma
- Centers for Disease Control and Prevention: Morbidity and Mortality Weekly Report, May 3, 2011 – Vital Signs: Asthma Prevalence, Disease Characteristics, and Self-Management Education – US, 2001-2009
- Up-To-Date: Diagnosis of asthma in adolescents and adults
- Up-To-Date: An overview of asthma management
- Up-To-Date: Office spirometry

