Asthma: Clinical Pearls to Accompany Concept Map

When Should Asthma be Suspected?

- Often the presentation is obvious - presentation to medical care with acute onset of wheezing that is albuterol responsive and improves after oral corticosteroids
- Sometimes, the history is less evident; be mindful of these clues:
    - **Nocturnal cough** or **cough present only with exertion**
    - Strong personal and/or family history of **atopic disease** (asthma, allergic rhinitis, atopic dermatitis)
    - Exertional **chest tightness** (even if no wheeze heard)
    - Improvement of symptoms with **albuterol use**
    - Consistently worsening respiratory symptoms (cough, SOB) with **season** or **location** change
- Spirometry (i.e., "PFTs") can be helpful in confirming a diagnosis when there is uncertainty but is certainly not necessary when the diagnosis is readily apparent
    - Diagnostic PFTs in adolescents/adults:
        - Reduced FEV1/FVC ratio
        - Reversal with bronchodilator: increase in FEV1 12% and absolute increase in FEV1 by 200 mL
    - If asymptomatic at time of PFTs, results are often normal and so testing should be repeated
- Keep in mind these asthma mimics:
    - **Foreign object aspiration** - albuterol can help airway obstruction in this case even though it doesn't remove the foreign object
    - **Bronchiolitis** - there is some practice variation as to whether a child <2 years who presents with acute onset of viral-induced "wheeze" (?rales ?crackles) is diagnosed with "viral bronchiolitis" or "reactive airway disease" - and this often has to do whether or not albuterol and steroids were given, **even if they were ineffective**.
    - **Congenital heart disease** - look for a murmur, feed-associated tachypnea, or hepatomegaly

What Are Essential Elements in Taking a History for a Patient with Known Asthma?

- Regarding chronic symptoms: use clinical tools like the ACT (Asthma Control Test) to determine:
    - Frequency of daytime symptoms
    - Frequency of nighttime symptoms (don't forget cough)
    - Limitation of activity (only with exertion? also at rest/with usual activity?)
    - Frequency of rescue medication use
    - Adherence to controller medication(s) (if prescribed)
    - Number of courses of oral corticosteroids over the past year
    - Number of hospitalizations over the past year
    - Any lifetime hospital / ICU admissions, and if so, any intubations
    - Typical triggers and any measures already undertaken to minimize these (e.g., URI? Smoke/toxin exposure? Mold? Pet exposure? Allergy season? Exercise? Cold weather? Environmental trigger (e.g., carpet, old apartment)?)
- Regarding acute presentation (may need to be done concomitantly with therapy depending on patient acuity):
    - When did the symptoms start?
    - What triggered this presentation (see above list, also ask about missed controller doses)

- Frequency of rescue medicine use, including when last administered, and ?relief of symptoms with interventions
- Compared to a typical exacerbation, how bad is this one?
- PO intake/hydration status (re: need for IVF resuscitation)?

What Are Essential Elements in Performing a Physical Exam for a Patient with Asthma?

- **Vital signs** are vital: HR, RR, SpO2, respiratory support required
  - Remember that fevers in children can cause tachycardia and tachypnea in and of themselves - if febrile on initial presentation, re-examine after antipyresis
- Respiratory exam:
  - **Work of breathing** - is the patient comfortable? Is there **accessory muscle use** (in ascending order of severity: subcostal retractions, belly breathing, intercostal retractions, supraclavicular retractions)?
  - **Air entry** - lack of wheezing is NOT reassuring if patient has poor air entry throughout all lung fields - patient's airways may simply be too collapsed to produce a wheezing sound
  - **Wheezing** - in ascending order of concern: only present with end-expiration --> only present with expiration --> present with inspiration and expiration --> no wheeze due to no air entry
  - **Inspiratory:expiratory ratio**: prolonged expiration is concerning (suggestive of airway obstruction during expiration)
  - **Other adventitious sounds**: dynamic airway obstruction in the setting of mucus plugging can cause focal changes in a lung exam, but a fixed asymmetry in lung exam should prompt a CXR (particularly in the setting of fever to r/o pneumonia)
  - ** be sure to document **timing relative to most recent albuterol dose**

How Do We Manage Asthma?

- In the acute setting
  - Use a clinical scoring tool like the HASS to determine severity (see asthma clinical pathway for more details)
  - Depending on severity, options include:
    - Single dose of albuterol with observation for improvement, with consideration of dexamethasone pending severity of exacerbation
    - Immediate administration of Unineb (3 back-to-back administrations of albuterol with ipratropium) with steroid (dexamethasone PO vs prednisolone PO vs methylprednisolone IV)
    - Pending response to the above, consider:
      - **Good response** with total or near-total resolution in symptoms: observe for 2-4 hours for worsening of symptoms / need for additional rescue doses to help determine disposition
      - **Partial response** with ongoing / worsening symptoms: re-dose albuterol, give steroid if not already administered, and have a low threshold to give Mg/NS bolus (normal saline bolus administered due to hypotension with magnesium sulfate)
      - **No response** or **rapid worsening**: consider continuous albuterol, give steroid/Mg/NS bolus if not already given, low threshold for VBG/CXR, likely ICP/ICU admission
- Over the long haul: classify asthma severity and prescribe controller medicine in accordance with severity (see chart below)
  - **Mild intermittent** - albuterol PRN

- **Mild persistent** - albuterol PRN with low-dose inhaled corticosteroid (ICS)
- **Moderate persistent** - albuterol PRN with moderate-dose ICS OR low-dose ICS alongside leukotriene receptor antagonist (montelukast)
- **Severe persistent** - albuterol PRN with high-dose ICS OR med-dose ICS alongside leukotriene receptor antagonist (montelukast)
- **At all stages** - trigger avoidance, allergy control (second generation H1 blockers, intranasal corticosteroids), intensive asthma education

FIGURE 4–2a. CLASSIFYING ASTHMA SEVERITY AND INITIATING TREATMENT IN CHILDREN 0–4 YEARS OF AGE

Assessing severity and initiating therapy in children who are not currently taking long-term control medication

Components of Severity		Classification of Asthma Severity (0–4 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	0	1–2x/month	3–4x/month	>1x/week
	Short-acting $beta_2$-agonist use for symptom control (not prevention of EIB)	≤2 days/week	>2 days/week but not daily	Daily	Several times per day
	Interference with normal activity	None	Minor limitation	Some limitation	Extremely limited
Risk	Exacerbations requiring oral systemic corticosteroids	0–1/year	≥2 exacerbations in 6 months requiring oral systemic corticosteroids, or ≥4 wheezing episodes/1 year lasting >1 day AND risk factors for persistent asthma		
		← Consider severity and interval since last exacerbation. Frequency and severity may fluctuate over time. → Exacerbations of any severity may occur in patients in any severity category.			
Recommended Step for Initiating Therapy (See figure 4–1a for treatment steps.)		Step 1	Step 2	Step 3 and consider short course of oral systemic corticosteroids	
		In 2–6 weeks, depending on severity, evaluate level of asthma control that is achieved. If no clear benefit is observed in 4–6 weeks, consider adjusting therapy or alternative diagnoses.			

Key: EIB, exercise-induced bronchospasm

Notes

- The stepwise approach is meant to assist, not replace, the clinical decisionmaking required to meet individual patient needs.
- Level of severity is determined by both impairment and risk. Assess impairment domain by patient's/caregiver's recall of previous 2–4 weeks. Symptom assessment for longer periods should reflect a global assessment such as inquiring whether the patient's asthma is better or worse since the last visit. Assign severity to the most severe category in which any feature occurs.
- At present, there are inadequate data to correspond frequencies of exacerbations with different levels of asthma severity. For treatment purposes, patients who had ≥2 exacerbations requiring oral systemic corticosteroids in the past 6 months, or ≥4 wheezing episodes in the past year, and who have risk factors for persistent asthma may be considered the same as patients who have persistent asthma, even in the absence of impairment levels consistent with persistent asthma.

No Family with Asthma Should Go Home Without...

- **Written** and **verbal** information regarding asthma (causes; pathophysiology as a chronic inflammatory disease often requiring years of therapy and rapid attention to new symptoms, which can be rapidly progressive and ultimately fatal; triggers including allergies, colds, seasonal

change, mold, pets, and smokers at home; the importance of daily use of preventive medicine even when feeling well), including an **asthma action plan**
- Reiteration of the importance of **spacer use**, with prescription for spacer refill as indicated
- Careful inquiry as to **what inhalers are at home** and **which should be used and when** (rescue vs daily preventive tx)
- Referral to **Breathe Easy at Home** at 617-534-2635 or asthma@bphc.org for a **free home inspection** if this has never been performed in the past

Be Mindful: Is it Asthma in the First Place?

- Parents often use the word "**wheezing**" to describe any noise with inspiration, even one that is not actually a "multiphonic sound most prominent during expiration due to dynamic airway collapse in the setting of bronchiolar smooth muscle inflammation and airway mucus plugging". If a child without known asthma comes in with parental concern for wheezing but without a history or exam otherwise consistent with asthma, **what might they actually be hearing**?
    - Prominent upper respiratory congestion with transmitted upper airway sounds
    - Stridor - is there a known airway anomaly (e.g., tracheo/bronchomalacia, subglottic stenosis) or a history suggestive of croup (winter-time, age 6 mo - 3 years, barky cough, improvement with cold air)
    - Stertor (snoring) - noise only present when sleeping, history of witnessed nocturnal hypopnea or apnea
    - Increased respiratory effort from any cause - bronchiolitis, pneumonia, upper airway obstruction, other lung pathology
    - *** if the family has albuterol at home for whatever reason (sibling, friend, etc), ask if albuterol was trialed and if so, whether or not this helped
- On a similar note - if a child seems to have sub-optimal control despite escalating doses of inhaled corticosteroids, **carefully assess for adherence**. Prescribing ever-higher doses of inhaled steroids without first ensuring (1) that the family understands the difference between rescue and control medicine, (2) that the family can correctly identify which inhaler is which, and (3) that the family is actually giving the inhaler without fail ("Lots of families have difficulty giving asthma medicine on a daily basis. On an average week, how often does *** miss a dose of their asthma control medicine?"). This is important for several reasons:
    - (1) medicine that is not given has no effect regardless of dose
    - (2) prescribing more inhalers of different strengths only adds to confusion
    - (3) if a child *does* begin taking an inhaler consistently and the inhaler is high potency, there is a real risk of **iatrogenic adrenal insufficiency** (think seizures from hypoglycemia!) and **growth suppression**

References for Additional Reading:

Papadopoulos NG, Arakawa H, Carlsen K-H, et al. International consensus on (ICON) pediatric asthma. *Allergy.* 2012. **67**, 976–997