Clinical presentation & diagnosis of asthma in pediatrics

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Asthma is the most common chronic disease of childhood and the leading cause of childhood morbidity from chronic disease as measured by school absences, emergency department visits, and hospitalizations.



Symptoms

Asthma leads to recurrent episodes of wheezing, breathlessness, chest tightness and coughing (particularly at night or early morning). Clinical symptoms in children 5 years and younger are

variable and non-specific.

Widespread, variable, and often reversible airflow limitation.



Clinical Features

- Recurrent Wheeze
- Recurrent Cough
- Recurrent Breathlessness
- Activity Induced Cough/Wheeze
- Nocturnal Cough/Breathlessness
- Tightness Of Chest



Symptomatology

- Cough 90%
- Wheezing 74%
- Exercise induced wheeze or cough 55%



Typical features of Asthma

- Afebrile episodes
- Personal atopy
- Family history of atopy or asthma
- Exercise /Activity induced symptoms
- History of triggers
- Seasonal exacerbations
- Relief with bronchodilators



When does Asthma begin?

- By 1 year 26%
- 1-5 years 51.4%
- > 5 years 22.3%

77% Of Asthma Begins In Children Less Than 5 Years





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• Good History Taking (ASK)

• Careful Physical Examination (LOOK)

• Investigations (PERFORM) – above 5 years only



History taking (Ask)

- Has the child had an attack or recurrent episode of wheezing (high-pitched whistling sounds when breathing out)?
- Does the child have a troublesome cough which is particularly worse at night or on waking?
- Is the child awakened by coughing or difficult breathing?
- Does the child cough or wheeze after physical activity (like games and exercise) or excessive crying?
- Does the child experience breathing problems during a particular season?



If the answer is 'yes' to any of the questions, a diagnosis of asthma should be considered



Physical Examination (Look)

- General Attitude And Well Being
- Deformity Of The Chest
- Character Of Breathing
- Thorough Auscultation Of Breath Sounds
- Signs Of Any Other Allergic Disorders On The Body
- Growth And Development Status



What all features one should look for specifically?

✓ Dyspnea

- Expiratory wheeze
- Accessory muscle movement
- Difficulty in feeding, talking, getting to sleep
- Irritability



✓ Cough

• Persistent/ recurrent / nocturnal/ exercise-induced

Associated conditions

- Eczema
- Allergic Rhinitis

✓ Weight/Height



What all investigations can be performed in asthmatic children? (PERFORM)

- **Peak expiratory flow rate:** It is highly suggestive of asthma when:
- >15% increase in PEFR after inhaled short acting β2 agonist
- >15% decrease in PEFR after exercise
- Diurnal variation > 10% in children not on bronchodilator

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1. Asthma by Consensus, IAP 2003 ACTOVERCO 2. CHILDHOOD ASTHMA by KHUBGLIMMDANLIPR, Recet a

Significant bronchodilator responsiveness or reversibility.

 Average daily diurnal PEF variability* is >10% (in children, >13%)o FEV1 increases by more than 12% and 200 mL from baseline (in children, by >12% of the predicted value) after 4 weeks of antiinflammatory treatment.



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WALRI (wheeze associated lower respiratory tract infections) or Viral Associated wheeze

- Febrile episodes
- Personal atopy absent
- Family history of asthma / atopy absent
- Variable response to bronchodilators

Early onset asthma

- Afebrile episodes
- Personal atopy present
- Family history of asthma / atopy present
- Predictable good response to bronchodilators



Differential diagnosis of wheezing

Age	Common	Uncommon	Rare
Less than	Bronchiolitis	Aspiration pneumonia	Asthma
6 months	Gastro- esophageal reflux	Bronchopulmonary dysplasia Congestive heart failure Cystic fibrosis	Foreign body aspiration
6 months -	Bronchiolitis	Aspiration pneumonia	Congestive heart failure
2 years	Foreign body	Asthma	
	aspiration	Bronchopulmonary dysplasia	
		Cystic fibrosis	
		Gastro-esophageal reflux	
2 - 5 years	Asthma	Cystic fibrosis	Aspiration pneumonia
	Foreign body	Gastro-esophageal reflux	Bronchiolitis
	aspiration	Viral pneumonia	Congestive heart failure
			Gastro-esophageal reflux



Early Childhood Asthma Diagnosis (below 6 years)

Diagnostic Tool	Findings that Support Diagnosis
Differential diagnosis	The diagnosis of asthma in children under age 6 is primarily one of exclusion.
Physical examination	If the child does not appear acutely ill and is growing, and there is no evidence specifically indicating another cause of symptoms, a trial of therapy is warranted.
Trial of therapy (bronchodilators)	Improvement with treatment supports a diagnosis of asthma.
Frequent reassessment	Health care professionals should always be prepared to reconsider the diagnosis if management is ineffective or if the clinical situation changes.



Diagnosis of asthma – physical examination

- Physical examination in people with asthma
 - Often normal
 - The most frequent finding is wheezing on auscultation, especially on forced expiration
- Wheezing is also found in other conditions, for example:
 - Respiratory infections
 - COPD
 - Upper airway dysfunction
 - Endobronchial obstruction
 - Inhaled foreign body
- Wheezing may be absent during severe asthma exacerbations ('silent chest')



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- The diagnosis of asthma should be based on:
 - A history of characteristic symptom patterns
 - Evidence of variable airflow limitation, from bronchodilator reversibility testing or other tests
- Document evidence for the diagnosis in the patient's notes, preferably before starting controller treatment
 - It is often more difficult to confirm the diagnosis after treatment has been started
- Asthma is usually characterized by airway inflammation and airway hyperresponsiveness, but these are not necessary or sufficient to make the diagnosis of asthma.











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Diagnosis of asthma – symptoms

- *Increased* probability that symptoms are due to asthma if:
 - More than one type of symptom (wheeze, shortness of breath, cough, chest tightness)
 - Symptoms often worse at night or in the early morning
 - Symptoms vary over time and in intensity
 - Symptoms are triggered by viral infections, exercise, allergen exposure, changes in weather, laughter, irritants such as car exhaust fumes, smoke, or strong smells
- Decreased probability that symptoms are due to asthma if:
 - Isolated cough with no other respiratory symptoms
 - Chronic production of sputum
 - Shortness of breath associated with dizziness, or peripheral tingling
 - Chest pain
 - Exercise-induced dyspnea with noisy inspiration (stridor)



- Confirm presence of airflow limitation
 - Document that FEV_1/FVC is reduced (at least once, when FEV_1 is low)
 - FEV₁/ FVC ratio is normally >0.75 0.80 in healthy adults, and >0.90 in children
- Confirm variation in lung function is greater than in healthy individuals
 - The greater the variation, or the more times variation is seen, the greater probability that the diagnosis is asthma
 - Excessive bronchodilator reversibility (adults: increase in FEV₁ >12% and >200mL; children: increase >12% predicted)
 - Excessive diurnal variability from 1-2 weeks' twice-daily PEF monitoring
 - Significant increase in FEV₁ or PEF after 4 weeks of controller treatment
 - If initial testing is negative:
 - Repeat when patient is symptomatic, or after withholding bronchodilators



Typical spirometric tracings



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How to confirm the diagnosis in patients taking controller treatment

 For many patients (25–35%) with a diagnosis of asthma in primary care, the diagnosis cannot be confirmed. If the basis of the diagnosis has not already been documented, it should be confirmed with objective testing.



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 For example, if lung function is normal, repeat reversibility testing when the patient is symptomatic, or after withholding SABA for >4 hours, twice-daily ICS-LABAs for >12 hours, and once-daily ICS+LABAs for >24 hours.



- Severity classifications:

- mild intermittent
- mild persistent
- moderate persistent
- severe persistent

Questions added to aid dx & assessment
PEF diurnal variation recommendations



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- Symptoms
 - Continual
 - Limited physical activity
 - Frequent exacerbations
 - Frequent nighttime symptoms

- Lung Function
 - − FEV₁ or PEF ≤ 60% of predicted
 - PEF variability >30%



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- Symptoms
 - Daily symptoms
 - Daily use of inhaled short-acting
 - beta₂ agonist
 - Exacerbations affect activity; <a>2 X/wk; may last days
 - Nighttime symptoms >1 time/wk

- Lung Function
 - FEV₁ or PEF > 60%
 - < 80% predicted
 - PEF variability >30%



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- Symptoms
 - Symptoms > 2 X/wk but <1 X/day</p>
 - Exacerbations may affect activity
 - Nighttime symptoms > 2
 X/mo

- Lung Function
 - FEV₁ or PEF ≥ 80%
 predicted
 - PEF variability 20-30%



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Mild Intermittent Asthma

- Symptoms
 - Symptoms < 2 X/wk</p>
 - Asymptomatic and normal PEF between exacerbations
 - Exacerbations brief (few hrs few days); intensity may vary
 - Nighttime symptoms < 2
 X/mo

- Lung Function
 - − FEV₁ or PEF ≥ 80% predicted
 - PEF variability < 20%</p>



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Terminology

- Phenotype:
- Patients with an identified phenotype of obstructive lung disease may share a cluster of clinical, functional and/or inflammatory features, without any implication of a common underlying mechanism
 - Examples: allergic asthma, aspirin-exacerbated respiratory disease, severe eosinophilic asthma
- Endotype:
- Among patients with obstructive lung disease, there are likely to be several specific endotypes associated with divergent underlying molecular causes, and with distinct treatment responses. These endotypes may or may not align with clinical or inflammatory phenotypes identified from studies limited to asthma or to COPD
 - Examples: emphysema due to alpha1-antitrypsin deficiency
- **Biomarker**: A defined characteristic measured as an indicator of normal biologic processes, pathogenic processes or response to an intervention
 - Potential examples: FeNO, blood eosinophils but these may not meet quality criteria for biomarkers





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