

DOES THIS KID HAVE ASTHMA?????



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- ▶ Non-Declaration Statement: I have no relevant relationships with ineligible companies to disclose within the past 24 months. (Note: Ineligible companies are defined as those whose primary business is producing, marketing, selling, re-selling, or distributing healthcare products used by or on patients.)

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Objectives

- ▶ Become familiar with using diagnostic indices for asthma.
- ▶ Recognize high risk populations in children raising their risk for having asthma.
- ▶ Review how to interpret simple spirometry in children.

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CASE 1

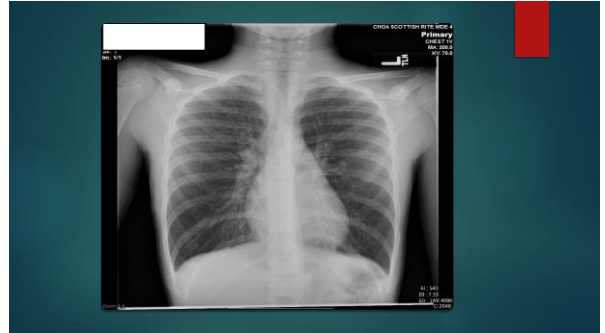


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CASE 1

- ▶ 16 yr old Hispanic female
- ▶ Wheezing episode as an infant
- ▶ Presents with wheezing and DIB
- ▶ Rhinovirus positive
- ▶ Respiratory failure requiring HFNC, continuous albuterol, and methylprednisolone

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Does this kid have asthma?

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What is asthma?

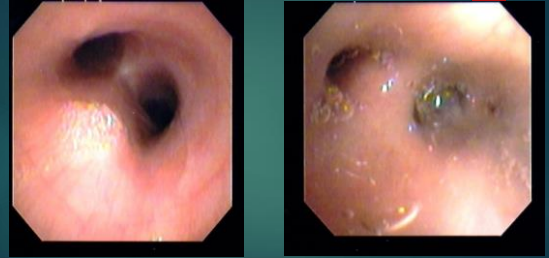
Asthma is a chronic inflammatory disorder of the airways in which many cells and cellular elements play a role; in particular, mast cells, eosinophils, T lymphocytes, macrophages, neutrophils, and epithelial cells. In susceptible individuals, this inflammation causes recurrent episodes of wheezing, breathlessness, chest tightness, and coughing, particularly at night or in the early morning. These episodes are associated with widespread but variable airflow obstruction that is often reversible either spontaneously or with treatment. The inflammation also causes an associated increase in the existing bronchial hyperresponsiveness to a variety of stimuli. Reversibility of airflow limitation may be incomplete in some patients with asthma.

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What is Asthma?

Asthma is chronic inflammation of the airways that causes symptoms like coughing or wheezing that gets better with a bronchodilator.

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Asthma Prevalence

Prevalence among children – 7%

Highest among poor children – 11.8%

Boys – 8.4% (5.5% of girls)

Non-Hispanic black children – 13.5%

• 2019 CDC Data

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Asthma is Underdiagnosed and therefore Undertreated in Infants and Children

- ▶ 122,829 children aged 12 to 14 years in 499 North Carolina public middle schools
- ▶ 17% had current asthma symptoms but no diagnosis

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Asthma is Underdiagnosed and therefore Undertreated in Infants and Children

Of those 17% :

- ▶ 20% missed a half day or more of school per month
- ▶ 25% had limited activities
- ▶ 32% had sleep disturbances
- ▶ 7% had 1 or more emergency department visits for asthma-like symptoms
- ▶ 5% reported wheeze-related hospitalizations

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Risk Factors – Asthma Predictive Index

2 – 3 episodes of wheezing in the past year

MAJOR

MINOR

▶ Atopic dermatitis

▶ Food Allergy

▶ Family history of asthma

▶ Allergic Rhinitis

▶ Eosinophilia

▶ Wheezing without colds

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Asthma Predictive index

- ▶ 96% specificity
- ▶ 26% sensitivity
- ▶ Poor PPV
- ▶ High NPV



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Pediatric Asthma Risk Score




- ▶ Cincinnati Childhood Allergy and Air Pollution Study (CCAAPS)
- ▶ 762 infants born 2001-2003 in Cincinnati, OH and North Kentucky
- ▶ Parents with documented atopy (>1 allergy symptom and skin prick testing positive (SPT) to > 1 aeroallergen)
- ▶ Annual exams at ages 1, 2, 3, 4, and 7 years-old
 - Monitored for allergy symptoms at each visit wheezing apart from colds, eczema, rhinitis, skin prick testing
 - 7 year-old visit – objective evaluation for asthma



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Pediatric Asthma Risk Score

Clinical risk factor	Nonasthmatic subjects (n=146)	Asthmatic subjects (n=190)	P value
Maternal history of asthma	24.0% (116)	42.6% (203)	<.001
Maternal history of eczema	12.0% (56)	45.3% (220)	<.001
Child's history of eczema	20.4% (145)	68.4% (328)	<.001
Early hospital admission	10.7% (77)	37.8% (183)	<.001
Child's history of hospitalization (asthma or infection)	35.1% (252)	52.7% (253)	.003
Positive SPT response to at least 1 allergen	53.0% (384)	71.6% (345)	.003
Positive SPT response to at least 2 allergens	18.2% (131)	38.2% (183)	.02
Positive SPT response to aeroallergen (positive to at least 1 SPT allergen)	30.7% (221)	62.0% (297)	.001
Personal risk factors			
Family asthma	37.7% (275)	58.6% (281)	.001
Child's eczema	19.4% (140)	38.6% (185)	.001
Male sex	55.6% (402)	61.1% (293)	.18



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Pediatric Asthma Risk Score (PARS) Sheet

	Possible Scores		Child's Score
	No	Yes	
1. Parental Asthma	0	2	
2. Eczema before age 3 years	0	2	
3. Wheezing apart from colds	0	3	
4. Wheezing before age 3 years	0	3	
5. African-American Race	0	2	
6. SPT positive to ≥ 2 aero and/or food allergens	0	2	

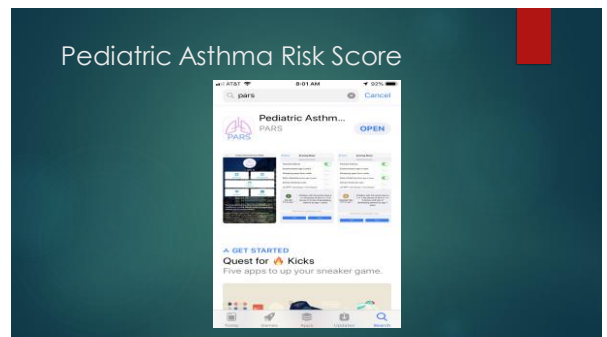
Child's PARS (add lines 1-6 above)

Score	Risk of Asthma by age 7 years	Patient Score Interpretation
0	5%	Children with these scores have a 1 in 33 (score of 0) to a 1 in 9 (score of 4) risk of developing asthma by age 7 years
1	6%	
2	8%	
3	11%	
4	15%	Children with these scores have a 1 in 7 risk (Score of 5) to a 1 in 3 (Score of 8) risk of developing asthma by age 7 years
5	19%	
6	25%	
7	32%	
8	40%	Children with these scores have a 2 in 5 (Score of 9) to a 4 in 5 (Score of 14) risk of developing asthma by age 7 years
9	49%	
10	58%	
11	66%	
12	79%	

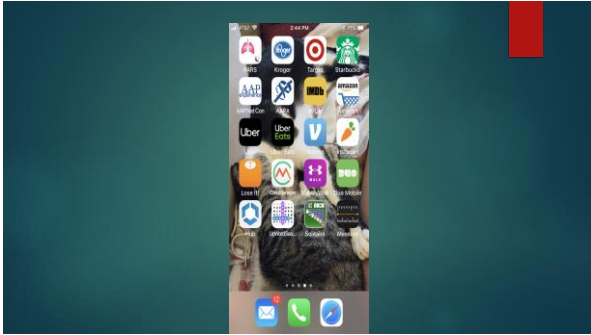
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- ### Pediatric Asthma Risk Score
- ▶ PARS better for predicting likelihood of developing asthma vs Asthma Predictive Index
 - ▶ Higher sensitivity and PPV
 - ▶ Better predictor for mild-moderate asthma risk patients

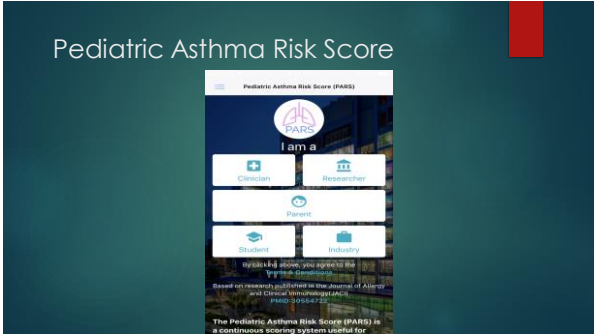
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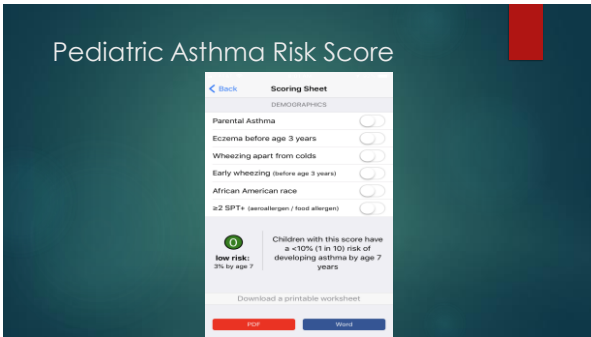
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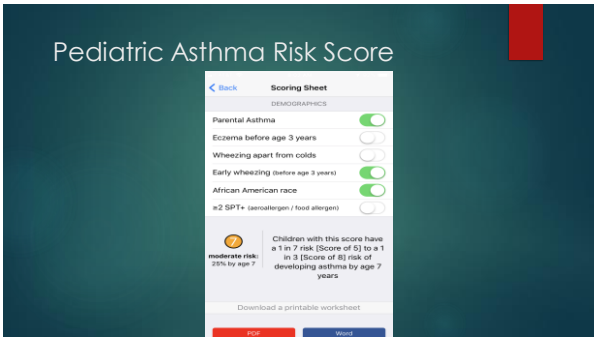
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Cough and Asthma

- Nocturnal Cough 
- Cough first thing in the morning 
- Cough during or after exercise 
- Exercise Coughing : Uncontrolled asthma or Exercise Induced Asthma

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Spirometry in Asthma

- ▶ Diagnosis
 - ▶ Detection of airway obstruction
 - ▶ Rule out differential diagnoses
- ▶ Management and Achieving control
 - ▶ Objective assessment
 - ▶ Identify obstruction in patients with low symptom awareness
 - ▶ Track disease progression and response to therapy

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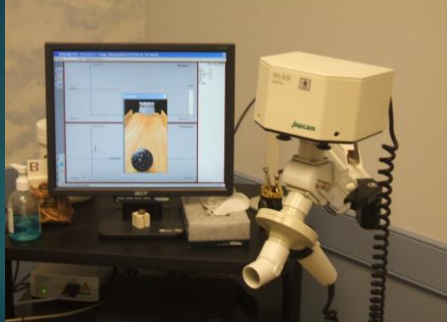

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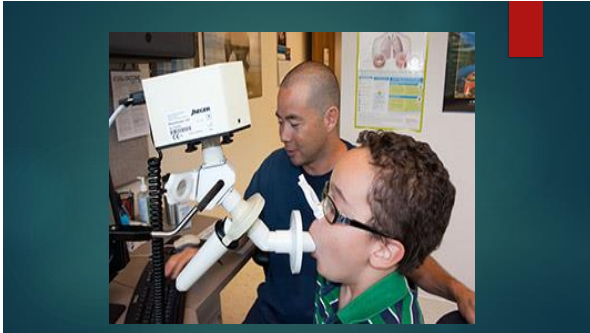
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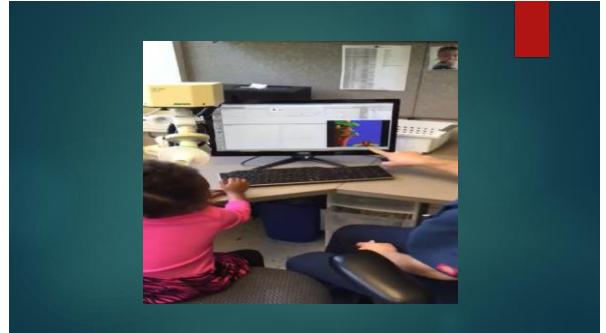
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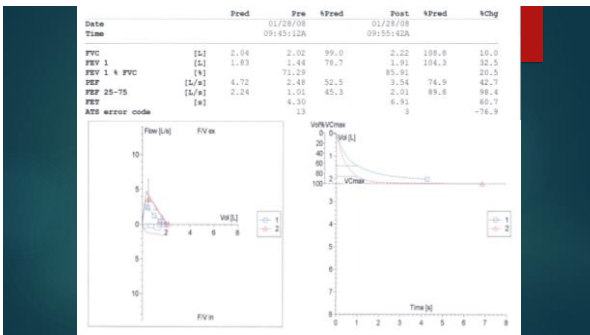
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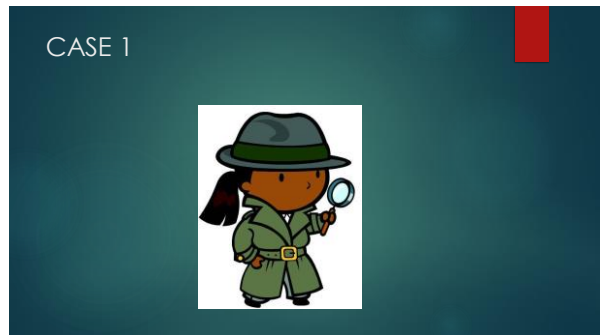
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CASE 1

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- ▶ Presents with wheezing and difficulty breathing
- ▶ Rhinovirus positive
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CASE 1

- ▶ Not very physically active but coughs with laughter
- ▶ No cough or snoring at night, sometimes does in the morning
- ▶ Never allergy tested but got hives after eating peanuts and shrimp; sneezes around cats
- ▶ Eczema as a baby
- ▶ No family history of asthma
- ▶ No recurrent sinopulmonary infections
- ▶ FEV1/FVC ratio 72%, improves to 88% after bronchodilator

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Does this kid have asthma?

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CASE 2

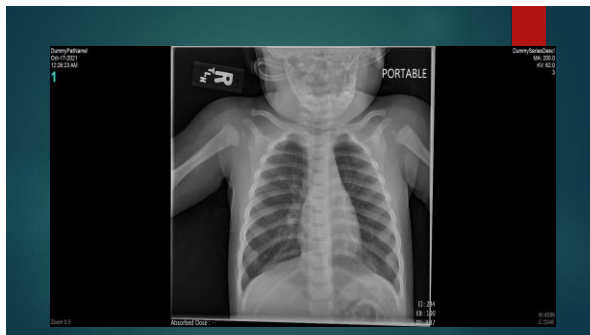


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CASE 2

- ▶ 6 month old African American female
- ▶ Hospitalized with RSV bronchiolitis at 4 months of age
- ▶ Now hospitalized with respiratory failure requiring full face mask Bipap, continuous albuterol, ipratropium bromide, methylprednisolone, and magnesium sulfate
- ▶ Rhinovirus positive

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CASE 2

- ▶ Mother had bronchitis as a child and her older brother is the same way as mom was
- ▶ Never diagnosed with eczema but gets very dry skin that irritates her
- ▶ Got a rash around her lips after eating eggs; haven't introduced peanut butter
- ▶ No cough when she gets excited or cries, no cough at night
- ▶ No choking or coughing with feeds
- ▶ No recurrent sinopulmonary infections

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Does this kid have asthma?

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CASE 2

- ▶ Mother had bronchitis as a child and her older brother is the same way as mom was
- ▶ Never diagnosed with eczema but gets very dry skin that irritates her
- ▶ Got a rash around her lips after eating eggs; haven't introduced peanut butter
- ▶ No cough when she gets excited or cries, no cough at night
- ▶ No recurrent sinopulmonary infections

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CASE 3



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CASE 3

- ▶ 10 yr old Asian male
- ▶ Visiting from Denver
- ▶ Hospitalized with respiratory failure requiring HFNC, continuous albuterol, and methylprednisolone
- ▶ Mycoplasma positive

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- ▶ No family history of asthma
- ▶ No known food allergies but burps a lot
- ▶ No known environmental allergies but is always congested
- ▶ No eczema
- ▶ No cough with exercise or laughter or at night
- ▶ No recurrent sinopulmonary infections
- ▶ Snores loudly
- ▶ FEV1/FVC ratios 95%, no change with a bronchodilator

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Does this kid have asthma?

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CASE 4



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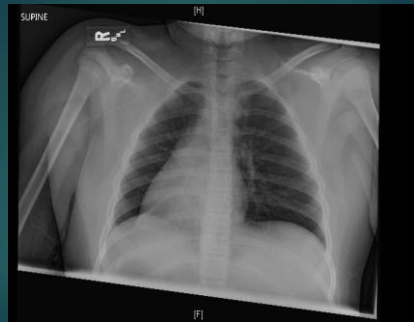
CASE 4

- ▶ 12 year old Caucasian male
- ▶ Diagnosed with asthma as a young child for chronic cough
- ▶ Has been on several different medications but can't keep his asthma under control
- ▶ No hospitalizations but has been on lots of steroids and antibiotics

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- ▶ Father has asthma and chronic cough
- ▶ No eczema
- ▶ No food allergies
- ▶ No environmental allergies but is always congested
- ▶ Colds always turn into pneumonia and he has had numerous ear infections and 3 sets of tubes
- ▶ Coughs with activity, laughter, at night, and first thing in the morning
- ▶ FEV1/FVC ratio 65%, no change with bronchodilator

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DOES THIS KID HAVE ASTHMA?

WHAT ELSE COULD IT BE?

- ❖ Primary Ciliary Dyskinesia / Kartagener's Disease
- ❖ Dysphagia / Aspiration
- ❖ Cystic Fibrosis
- ❖ Immunodeficiency
- ❖ Airway Anomalies
- ❖ Foreign Body

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Take Home Points

- ▶ Asthma is very common in children so don't forget to screen for it and keep it in your differential for cough.
- ▶ There are a number of screening tools that can be used to diagnose asthma, but if you keep in mind those risk factors you will do fine.
- ▶ Refer any child in whom the diagnosis is not clear or who is not responding to therapy.

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References

- ▶ 2020 Focused Updates to the Asthma Management Guidelines: A Report from the National Asthma Education and Prevention Program Coordinating Committee Expert Panel Working Group (<https://www.nhlbi.nih.gov/health-topics/focused-updates-asthma-management-guidelines>)
- ▶ Thomas, H, Garrett, R. Interpretation of Spirometry : A Graphic and Computational Approach. Chest Journal. 1984 July; Vol 86(1): 129-131.
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- ▶ Yeatts, K, Shy, C, Music, S. Health Consequences for Children With Undiagnosed Asthma-like Symptoms. Arch Ped Adol Med. 2003 July;157(6):540-544.
- ▶ A School-Based Case Identification Process for Identifying Inner City Children With Asthma : The Breathable Program [https://journal.chestnet.org/article/S0012-3692\(15\)31929-2/fulltext](https://journal.chestnet.org/article/S0012-3692(15)31929-2/fulltext)
- ▶ <https://www.cdc.gov/asthma/asthma-data.htm>

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Questions?

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