Managing a Child with Recurrent Breathlessness

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A Systematic Approach

4 important steps

- **Define** the problem**–** history gathering
- **Assess –** conducting a focus physical examination
- **Reasoning –** clinical reasoning and generating a hypothesis
- **Treatment** – clinical intervention

Define the problem
Elicit the concerns

- What is the matter? (chief complaints – “physical”)
- What matters? (main concern- “heart matters”)

Define the problem

Time frame

- **Acute** –bronchiolitis, pneumonia, ALTB, Epiglottis, Foreign Body, Myocarditis, Ketoacidosis
- **Chronic** especially if it started since birth – highly likely to have congenital airway anomalies
- **Recurrent**

DEFINE : Breathlessness in Children

- **Breathlessness or Not?**
- Dysfunctional breathing disorder
- *Disorder in breathing pattern - dyspnoea, chest tightness, sighing and chest pain which arise secondary to alterations in respiratory pattern and rate*
  - Hyperventilation syndrome – associated with numbness and tingling perioral and extremities, dizziness, inability to “get air in”, usually adolescent
  - Vocal Cord Dysfunction – anxiety related
    - 5% of children with asthma has DBD and is associated with poor asthma control

Define the Problem
Associated symptoms

- Blocked nose
- Chest pain – unlikely to be respiratory cause
- Exertion dyspnea – cardiac cause; deconditioning eg obese child
- Chronic productive cough – suppurative lung disease
- Wheezing – viral wheeze, asthma, foreign body
- Feeding difficulties – Gastro-esophageal reflux
- Neurodevelopmental problem – recurrent aspiration
- Malnutrition and failure to thrive – chronic infection such as PTB, Cystic Fibrosis
- Recurrent respiratory infection - immunodeficiency

McPhail GL. Current Probl Pediatr Adolesc Health Care 2013;43

Assessment
Physical examination

Respiratory

- Nasal obstruction
- Chest deformity
- Stridor
- Prolonged/low pitch inspiration and expiration
- Whistling rhonchi (wheeze with prolonged expiration)
- Extensive coarse crepitation/crackles

Non Respiratory

- Clubbing
- Cardiomegaly
- Heart murmur
- Failure to thrive
- Facial congestion
- Neurological deficit
- Anxiety/panic


Clinical REASONING

Clinical Hypothesis
Blocked Nose

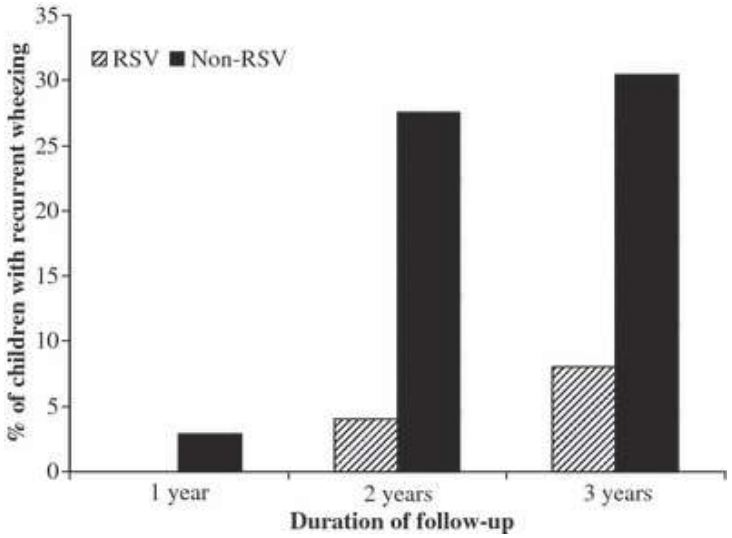
Problem	**Supportive evidence**
• Allergic Rhinitis	• Allergic shiners • Swollen nasal turbinates
• Structural	• Deviated septum • Narrowed nasal passage

Clinical Hypothesis

Recurrent breathlessness with wheezing

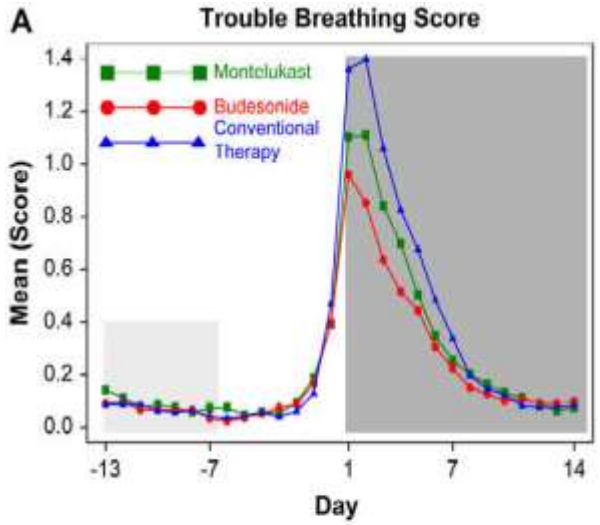
- Common problem in childhood
- Under the age of 5 years particularly those exposed to prenatal and postnatal smoke exposure; smaller lungs and airway
- Associated with Viral URTI (Viral induced wheezing)
- Bronchial Asthma

Recurrent wheezing after respiratory syncytial virus or non-respiratory syncytial virus bronchiolitis in infancy: a 3-year follow-up

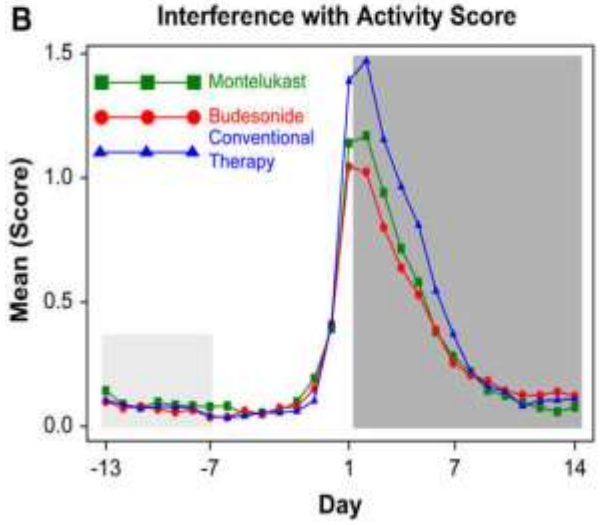


Valkonen H. Allergy 2009
Volume 64, Issue 9, pages 1359-1365, 23 MAR 2009 DOI: 10.1111/j.1398-9995.2009.02022.x
http://onlinelibrary.wiley.com/doi/10.1111/j.1398-9995.2009.02022.x/full#f4

Treatment
Episodic treatment of preschool wheeze



	Montelukast	Budesonide	Conventional Therapy
Trouble Breathing Score AUC	4.2 (3.1, 5.3)	4.2 (3.1, 5.2)	6.7 (5.2, 8.1)
P-value vs. Conventional Therapy	0.003	0.003	–



	Montelukast	Budesonide	Conventional Therapy
Interference with activity score AUC	4.3 (3.1, 5.4)	4.8 (3.7, 5.9)	7.0 (5.5, 8.6)
P-value vs. Conventional Therapy	0.001	0.01	–

BACHARIER LB et al. J ALLERGY CLIN IMMUNOL 2008

Why not “wait and see”

Issues with recurrent wheeze

- Chronic ill health
- Acute healthcare utilization
- Increasing health expenditure
- Parental anxiety
- Loss of productivity
- Airway remodeling

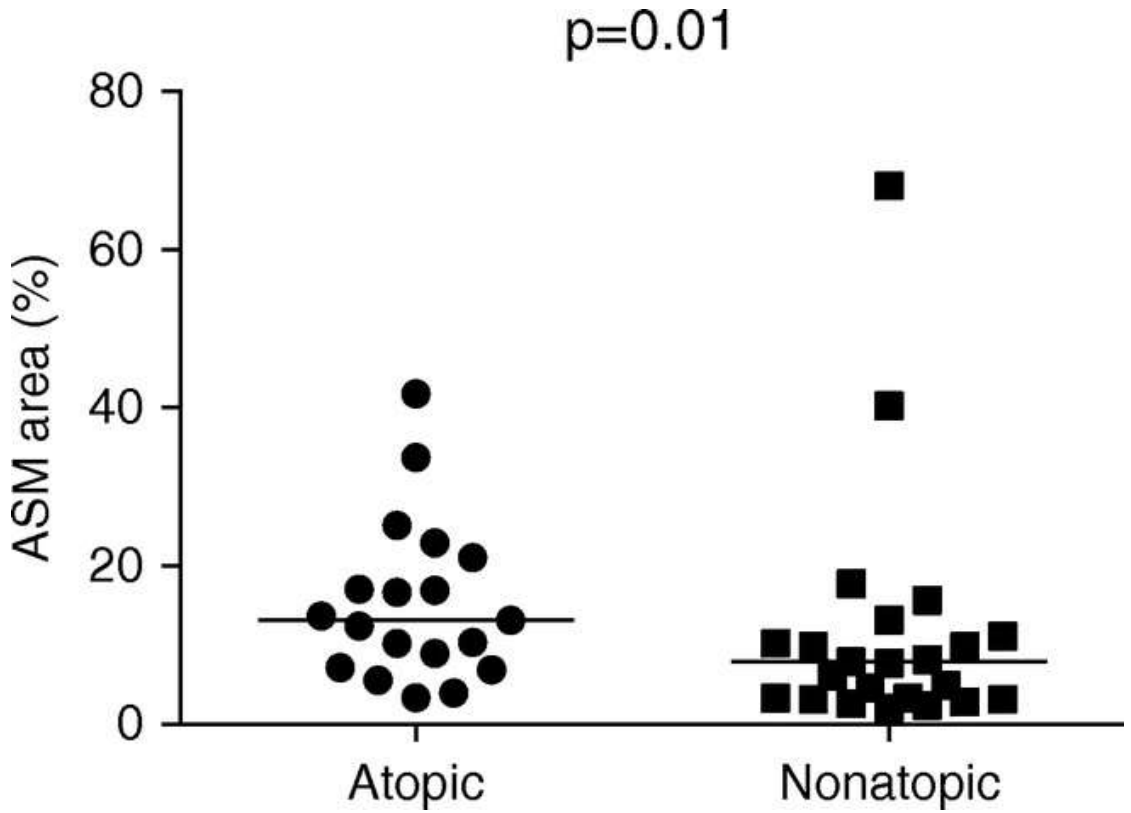


Figure 4. Airway smooth muscle (ASM) area is larger in preschoolers with severe recurrent wheeze with atopy than without atopy. There is one missing datum.

Lezmi G et al. Am J Respir Crit Care Med, 2015:192,164-171
http://www.atsjournals.org/doi/abs/10.1164/rccm.201411-1958OC

Asthma Predictive Index
Clinical Index to Define Asthma
Young child with 4 or more wheezing episodes

- **Major criteria**
  - **Parental MD Asthma**
  - **MD eczema**
  - **Sensitization to aeroallergen**
- **Minor criteria**
  - **MD allergic rhinitis**
  - **Wheezing apart from colds**
  - **Eosinophil (>4%)**
  - **Sensitization to food allergen**

Negative stringent index, 5 % asthma at 6-13 years old
Positive stringent index, 76 % active asthma

Castro-Rodriguez JA. AJRCCM 2000;162:1403-6

Recurrent wheeze: Is it Asthma? Asthma Predictive Index

Major Criteria	Minor Criteria
1. Parental MD asthma †	1. MD allergic rhinitis §
2. MD eczema ‡	2. Wheezing apart from colds
	3. Eosinophilia (≥4%)

*Loose index for the prediction of asthma: early wheezer plus at least one of two major criteria or two of three minor criteria. Stringent index for the prediction of asthma: early frequent wheezer plus at least one of the two major criteria or two of three minor criteria.

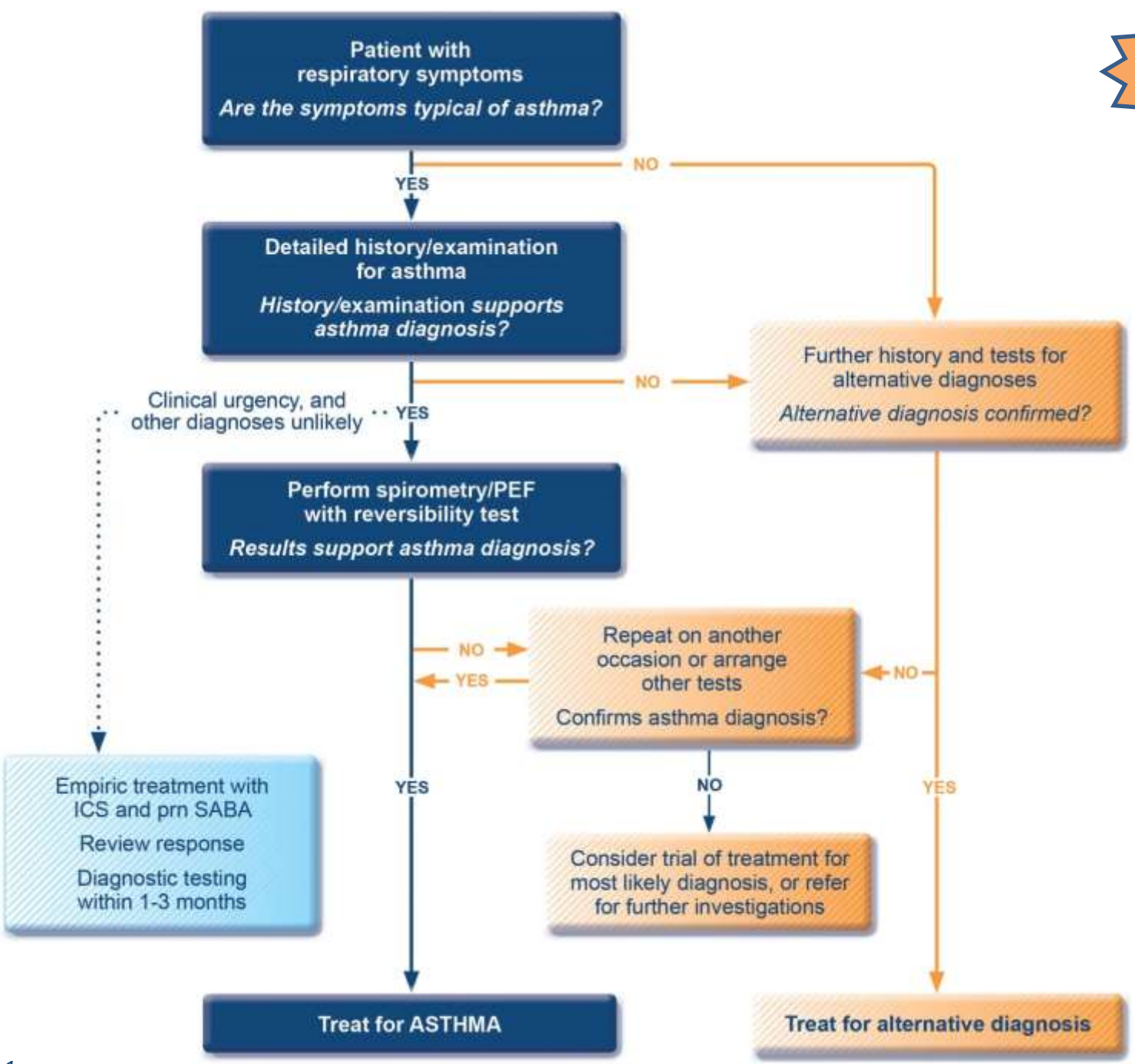
†History of a physician diagnosis of asthma. ‡Physician diagnosis of atopic dermatitis at age 2 or 3. §Physician diagnosis of allergic rhinitis at age 2 or 3.

Castro-Rodriguez J A. JACI 2010 Volume 126, Issue 2, 2010, 212–216


medical
doctor
hospital
hospital
doctor
medical

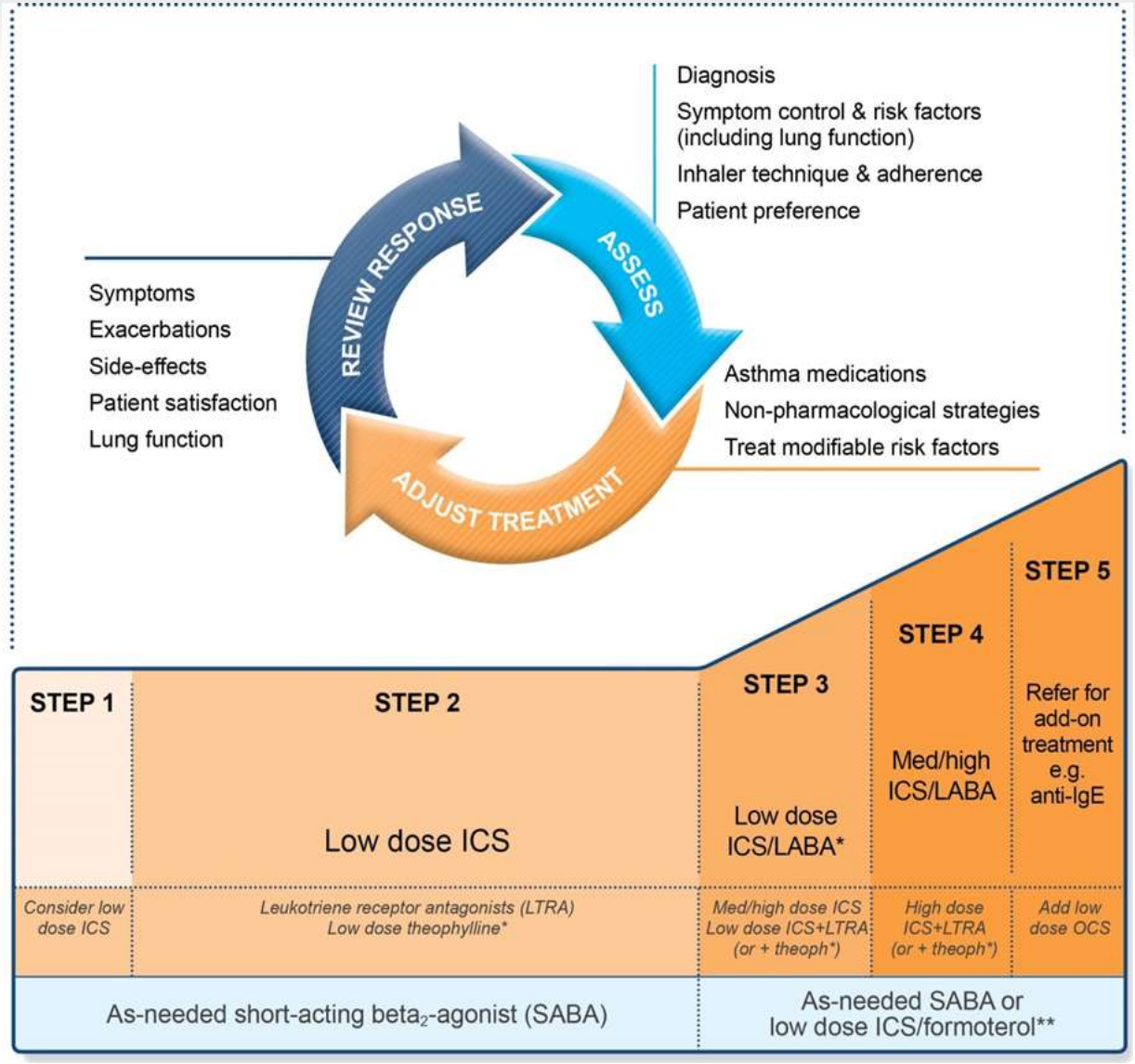
Features suggesting asthma in children ≤5 years

Feature	Characteristics suggesting asthma
Cough	Recurrent or persistent non-productive cough that may be worse at night or accompanied by some wheezing and breathing difficulties. Cough occurring with exercise, laughing, crying or exposure to tobacco smoke/air pollution in the absence of an apparent respiratory infection
Wheezing	Recurrent wheezing, including during sleep or with triggers such as activity, laughing, crying or exposure to tobacco smoke or air pollution
Difficult or heavy breathing or shortness of breath	Occurring with exercise, laughing, or crying
Reduced activity	Not running, playing or laughing at the same intensity as other children; tires earlier during walks (wants to be carried)
Past or family history	Other allergic disease (atopic dermatitis or allergic rhinitis) Asthma in first-degree relatives
Therapeutic trial with low dose ICS and as-needed SABA	Clinical improvement during 2–3 months of controller treatment and worsening when treatment is stopped



GINA 2014, Box 1-1

Stepwise management - pharmacotherapy



*For children , theophylline is not recommended, and preferred Step 3 is medium dose ICS

**For patients prescribed BDP/formoterol or BUD/formoterol maintenance and reliever therapy

GINA assessment of asthma control in children ≤5 years

A. Symptom control

In the past 4 weeks, has the child had:

- Daytime asthma symptoms for more than few minutes, more than once/week? Yes❑ No❑
- Any activity limitation due to asthma? (runs/plays less than other children, tires easily during walks/playing) Yes❑ No❑
- Reliever needed* more than once a week? Yes❑ No❑
- Any night waking or night coughing due to asthma? Yes❑ No❑

Level of asthma symptom control		
Well-controlled	**Partly controlled**	**Uncontrolled**
None of these	1-2 of these	3-4 of these

B. Risk factors for poor asthma outcomes

ASSESS CHILD'S RISKS FOR:

- Exacerbations within the next few months
- Fixed airflow limitation
- Medication side-effects

Risk factors for poor asthma outcomes in children ≤5 years

Risk factors for exacerbations in the next few months

- Uncontrolled asthma symptoms
- One or more severe exacerbation in previous year
- The start of the child's usual 'flare-up' season (especially if autumn/fall)
- Exposures: tobacco smoke; indoor or outdoor air pollution; indoor allergens (e.g. house dust mite, cockroach, pets, mold), especially in combination with viral infection
- Major psychological or socio-economic problems for child or family
- Poor adherence with controller medication, or incorrect inhaler technique

Risk factors for fixed airflow limitation

- Severe asthma with several hospitalizations
- History of bronchiolitis

Risk factors for medication side-effects

- Systemic: Frequent courses of OCS; high-dose and/or potent ICS
- Local: moderate/high-dose or potent ICS; incorrect inhaler technique; failure to protect skin or eyes when using ICS by nebulizer or spacer with face mask

Does your child often use the blue spray inhaler more than twice a week?

Please see a doctor to evaluate your child's condition immediately.

Childhood ACT™

Understand the condition.
Prescribe the right treatment.

Below 19= uncontrolled

Above 20= Well controlled

Childhood ACT™

Understand the condition.
Prescribe the right treatment.

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.

Please follow the steps below to answer the **Childhood Asthma Control Test:**

1. Please let your child respond to the first four questions (1 to 4). If your child needs help reading or understanding the questions, you may help but please let your child select the response.

   Complete the remaining three questions (5-7) on your own and without letting your child's response influence your answers.
   Please take note that there are no right or wrong answers.

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

3. Add up each the score box for the total.

4. Bring your test along to discuss with your doctor about your child's total score.

Please let your child answer these following questions:

Score

Question 1 How is your asthma condition today?

- 0 Very Bad
- 1 Bad
- 2 Good
- 3 Very Good

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

- 0 It's a big problem, I can't do what I want to do.
- 1 It's a problem and I don't like it.
- 2 It's a little problem but it's okay.
- 3 It's not a problem.

Question 3 Do you cough because of your asthma?

- 0 Yes, all of the time.
- 1 Yes, most of the time.
- 2 Yes, some of the time.
- 3 No, none of the time.

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

- 0 Yes, all of the time.
- 1 Yes, most of the time.
- 2 Yes, some of the time.
- 3 No, none of the time.

Please answer the following questions on your own:

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

5	4	3	2	1	0
Not at all	1-3 days/mo	4-10 days/mo	11-18 days/mo	19-24 days/mo	Everyday

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

5	4	3	2	1	0
Not at all	1-3 days/mo	4-10 days/mo	11-18 days/mo	19-24 days/mo	Everyday

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

5	4	3	2	1	0
Not at all	1-3 days/mo	4-10 days/mo	11-18 days/mo	19-24 days/mo	Everyday

Total Score:

Asthma Control Test™

Step 1: Circle your score for each question and write the number in the box. Please answer as honestly as possible. This will help you and your doctor discuss what your asthma is really like.

The following test can help people with asthma (12 years or older) assess their asthma control.

Please circle the appropriate score for each question. There are FIVE questions in total.

You can calculate your total Asthma Control Test score by adding up the numbers for each of your responses. Be sure to review your results with your doctor or nurse.

Turn over to find out what your score means.

						SCORE
Question 1	During the **past 4 weeks**, how often did your asthma prevent you from getting as much done at work, school or home?	All of the time 1	Most of the time 2	Some of the time 3	A little of the time 4	None of the time 5	
Question 2	During the **past 4 weeks**, how often have you had shortness of breath?	More than once a day 1	Once a day 2	3 to 6 times a week 3	Once or twice a week 4	Not at all 5	
Question 3	During the **past 4 weeks**, how often did your asthma symptoms (wheezing, coughing, shortness of breath, chest tightness or pain) wake you up at night or earlier than usual in the morning?	4 or more times a week 1	2 to 3 nights a week 2	Once a week 3	Once or twice 4	Not at all 5	
Question 4	During the **past 4 weeks**, how often have you used your rescue inhaler or nebulizer medication (such as salbutamol)?	3 or more times a day 1	1 or 2 times a day 2	2 or 3 times a week 3	Once a week or less 4	Not at all 5	
Question 5	How would you rate your **asthma control** during the **past 4 weeks**?	Not controlled 1	Poorly controlled 2	Somewhat controlled 3	Well controlled 4	Completely controlled 5	

Know your asthma score – ACT now

Step 2: Add up your score to get your total.

Step 3: **Turn over** to find out what your score means.

TOTAL

Written Asthma Action Plan (WAAP)

WAAP is a written, customized Plan:

- Manage asthma episodes
- Help to recognize deterioration in their condition promptly and respond appropriately

The aim of an WAAP is to assist the process of early intervention and to prevent or reduce the severity of acute asthma episodes

Summary: Managing a Child with Recurrent Breathlessness

- Common complaint in childhood
- Most are benign, due to transient wheeze, viral induced wheezing
- Other common cause of recurrent breathlessness in children from nasal obstruction and bronchial asthma
- Other respiratory origin eg structural airway anomalies, and non respiratory such as aspiration, cardiac condition should excluded

Summary: Managing a Child with Recurrent Breathlessness

- **D**efine, **A**ssess, clinical **R**easoning to generate clinical hypothesis and **T**reatment
- Imperative to re evaluate for improvement
- When progress is not as expected, review the clinical diagnosis and refer for second opinion if necessary

Clinical case I

- 1 year old male infant
- PH of one episode of RSV Bronchiolitis associated with breathing difficulty at 6 months of age
- Seen at your clinic for fever, runny nose and cough and breathing difficulty

Define the problem

- Acute?
- Chronic?
- Recurrent?
- Associated symptoms

Define the problem

- Had similar problem every month
- Associated with fever, blocked nose and cough
- Eczema at neck and elbows
- Paternal history of asthma and Allergic Rhinitis
- There were episodes of breathing difficulty after feeding

Assessment

- Thriving well
- Temperature 38 deg C, RR 52/min, PR 170/min
- Clear discharge from both nostrils
- Chest retraction
- Bilateral crepitation and wheeze
- Cardiovascular system: no murmur heard
- Abdomen : soft, not distended liver palpable at 2 cm below right costal margin

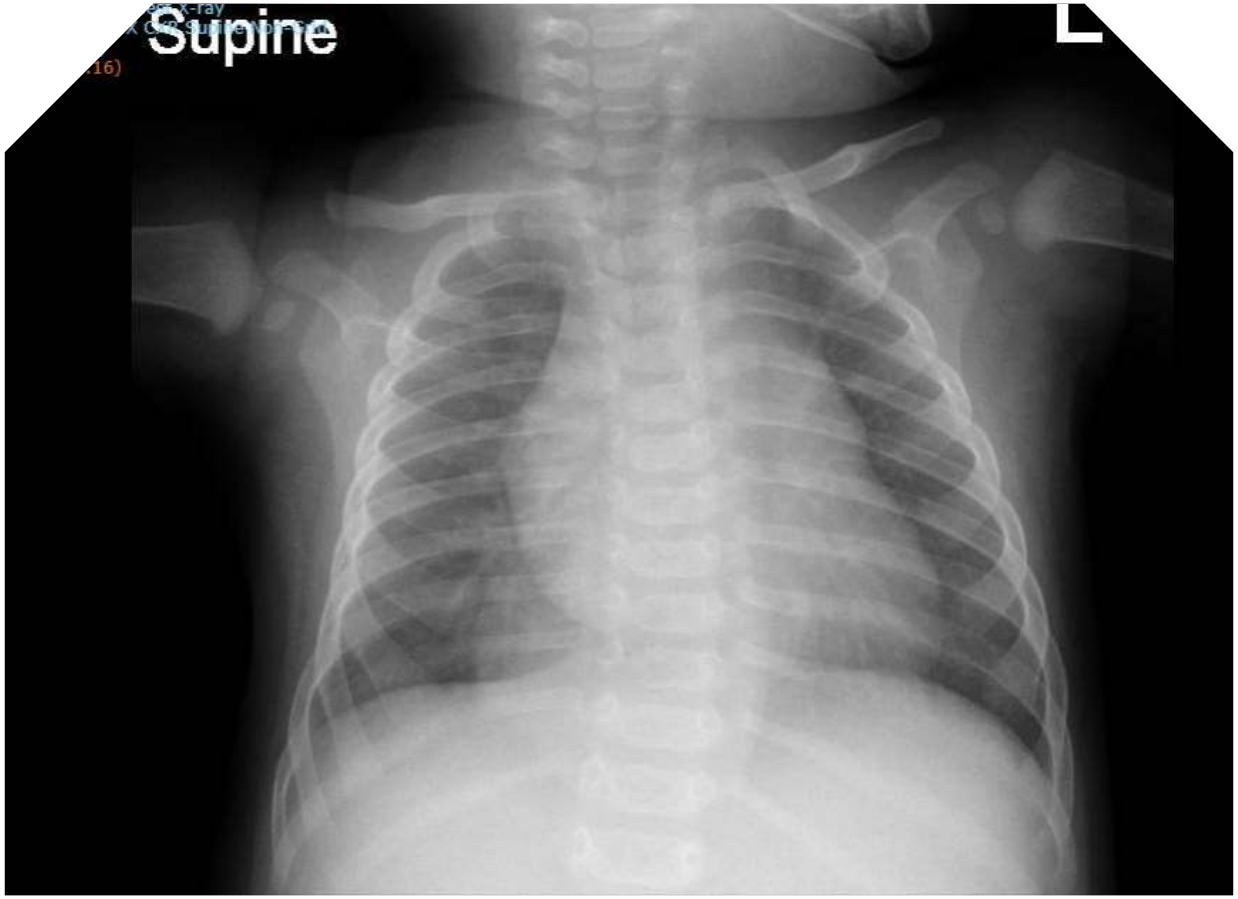
clinical Reasoning to generate clinical hypothesis

- Infant with recurrent breathlessness
- Personal history of Eczema
- Family history of Asthma and AR
- Any red flag?
- How will you approach this patient’s problem?

Infant with recurrent breathlessness

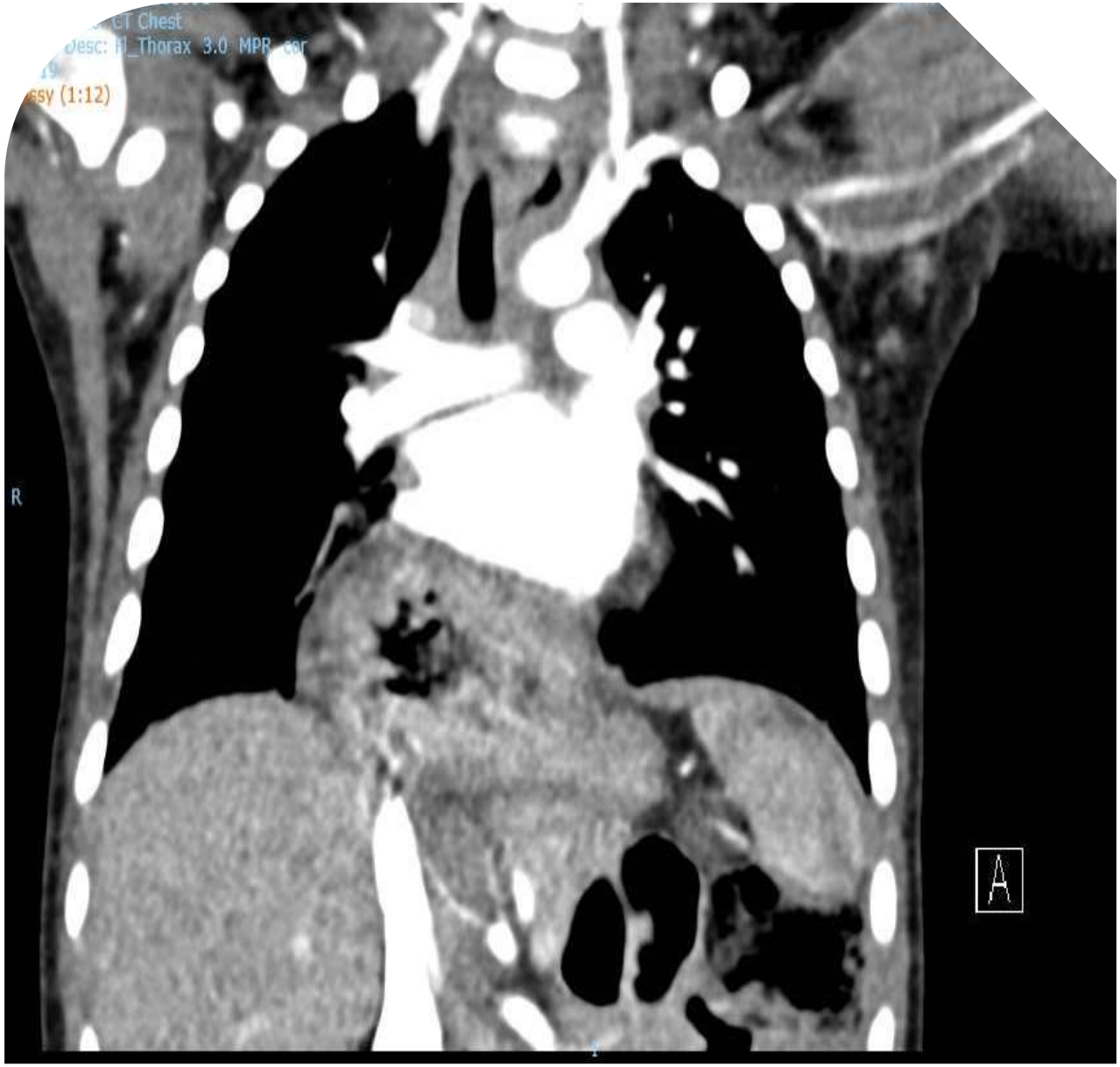
- What is your approach?
  - Treat as Viral Wheeze?
  - Treat as Bronchial Asthma?
  - Do a CXR?
  - Refer for investigation?

Investigations



CT Thorax

CT Thorax



Recurrent wheeze

- Diagnosis: recurrent viral wheeze
- Sliding diaphragmatic hernia
- Is it Asthma?

Clinical case II

- Background history
- Child is 18 months old
- AN was first seen at Respiratory Medicine at age of 6 months for recurrent breathlessness 2-3 days following a bout of runny nose and cough
- There was a family history of asthma and personal history of eczema
- Has been diagnosed as Viral wheeze and was on intermittent Salbutamol MDI via spacer/facemask.
- Also on follow up by ENT for ?laryngomalacia

With the background knowledge

- Define the problem
  - Acute
  - Chronic
  - Acute on chronic
  - New problem
- Associated symptoms
  - Runny nose and cough
  - Noisy breathing, especially after vigorous activities

Assessment

- What would you be looking for
  - Is the child having respiratory distress
  - What was the noisy breathing due to?
  - What else?

Assessment

- Well thrived
- Tachypnoeic
- Inspiratory and expiratory stridor
- Bilateral wheeze
- Eczema at flexural

clinical Reasoning

- Generate clinical hypothesis
- Any red flags?

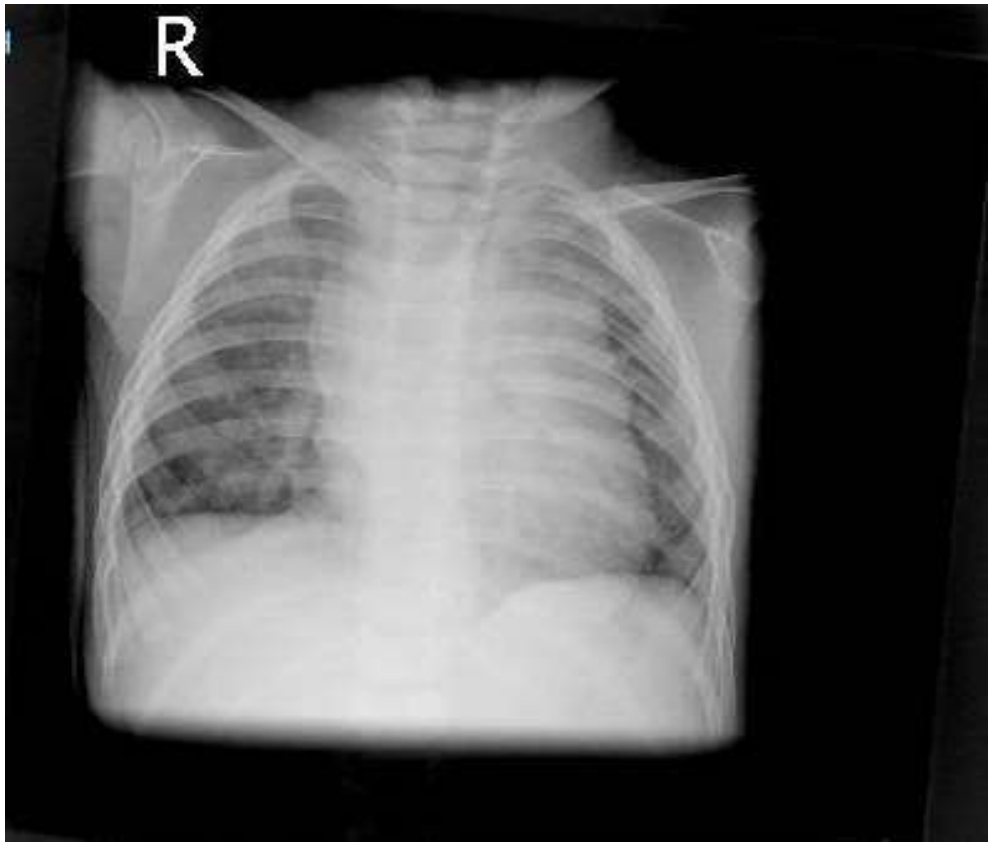
clinical Reasoning

- At 18 months with diagnosis of Laryngomalacia, would prominent inspiratory and expiratory stridor be expected?

Treatment

- How would you approach?
- Treat with bronchodilator
  - Recurrent wheeze with eczema
- Need to deal with the persistent stridor

Clinical case II: CXR



Cause of the stridor

- Bronchoscopy : extrinsic trachea obstruction
- 2 D Echo : double aortic arch leading to vascular sling
- Operated in 2009 with resolution of stridor
- Continue to have recurrent viral wheeze
- At age of 3 years + had recurrent wheeze and reported breathlessness after vigorous playing or running

What next?

- Asthma or not asthma?

Spirometry of Child at 7 years of age

- FVC Predicted : 2.06 L.
- · FVC Pre : 1.83 L (88.9 % Predicted).
- · FVC Post : 1.84 L (89.4 % Predicted).
- · Change FVC : 1 %.
- FEV1 Predicted : 1.81 L.
- · FEV1 Pre : 1.28 L (70.8 % Predicted).
- · FEV1 Post : 1.48 L (81.8 % Predicted).
- · Change FEV1 : 16 %.
- FEF25-75 Predicted: 2.18 L/s.
- · FEF25-75 Pre : 0.94 L/s (43.2 % Predicted).
- · FEF25-75 Post : 1.39 L/s (63.8 % Predicted).
- · Change FEF25-75 : 48 %.


THANK YOU
Terima Kasih
谢谢