From wheeze to Asthma and everything in between: PMG lecture

Omolemo Kitchin

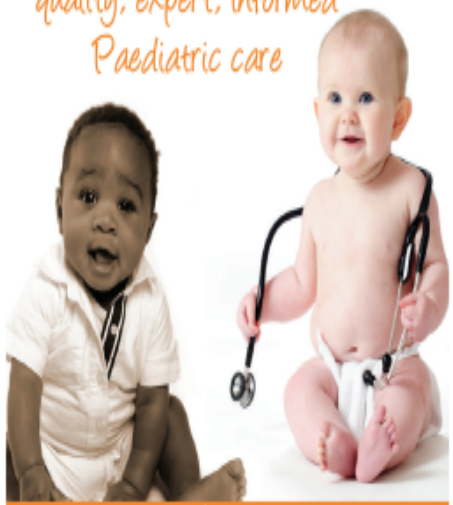
Paediatric Pulmonologist

Conflict of interest

- Past Chairman of NATIONAL ASTHMA EDUCATION PROGRAMME
- Extra ordinary Lecturer UNIVERSITEIT VAN PRETORIA UNIVERSITY OF PRETORIA YUNIBESITHI YA PRETORIA
- Chairman - Paediatric Management Group

Paediatric
Management Group

We strive for
quality, expert, informed
Paediatric care



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Paediatricians unite under this banner

Paediatric Management Group

Vaccination Schedule 2019

10 YEARS *of excellence*

Disease	Vaccine	Birth	6 weeks	10 weeks	14 weeks	6 months	9 months	12 months	15 months	18 months	6 years	9 years	12 years
TB	BCG	●											
Polio	bOPV	●	●										
Hepatitis B	Heber-Biovac	●											
Diphtheria, Tetanus, Polio, Pertussis Haemophilus Influenzae, Hepatitis B	Hexaxim OR Infanrix Hexa		● (8 weeks)	● (12 weeks)	● (16 weeks)					●			
Pneumococcal	Prevenar 13 OR Synflorix		●	●	●		●	● (Nine and a half months)					
Rotavirus	Rotarix OR RotaTeq		●	●	●								
Measles	Measbio					●		●	12 months Measbio not required if giving MMR				
Measles Mumps Rubella	Priorix OR MSD OMZYTA							●	MMR at 12 months instead of Measbio		●	Give MMR and Varilrix or Onvara separately at 6 years if not using Priorix Tetra	
Chickenpox	Varilrix OR ONVARA								●		●		
Measles Mumps Rubella + Chickenpox	Priorix Tetra	Priorix Tetra can be used at 12 months instead of Measbio, MMR and Varicella. Increased risk of febrile convulsion after the first dose of Priorix Tetra						●			●		
Meningococcal Conjugate	Menactra						●		●	For individuals 2-55 years administer 1 dose			
Hepatitis A	AVAXIM 80 OR Havrix Junior							●	Hep A with MMR not with Measbio	●			
Tetanus, Diphtheria Pertussis, Polio	TETRAXIM OR Boostrix Tetra OR ADACEL QUADRA						Tetraxim at 6 years or Boostrix Tetra at 6 years Boostrix Tetra can be given at 12 years if not given at 6 years. Adacel Quadra at 12 years				●		●
Tetanus, Diphtheria	Td										●		●
Human Papilloma Virus	Cervarix OR GARDASIL	Cervarix from 9-14 years or Gardasil from 9-13 years as 2 doses 6 months apart State programme: Cervarix to Grade 4 girls in public schools 9 -14 years. 2 doses 6 months apart										●	
Influenza	INFLUVAC VAXIGRIP	From 6 months, important for children in creche, chronic illness and respiratory problems. Start before the INFLUENZA season in MAY.											
Respiratory Syncitial Virus	SYNAGIS PALIVIZUMAB	RSV prophylaxis in high-risk infants-prevention of serious LRTI caused by RSV. Start January and end in May.											
Pneumococcal	PNEUMOVAX 23 (pneumococcal vaccine polyvalent, MSD)	Must have at least one dose of Conjugate PCV before Pneumovax 23. Pneumovax only in children older than 2 years with Immune Compromise or high risk of Pneumococcal infection. Two doses with 2nd dose 3-5 years after first.											

● STATE EPI VACCINES *These vaccines are available free from Government supplied clinics*

● RECOMMENDED OPTIONAL VACCINES *Some of the vaccines in this schedule are only available from private clinics*

Outline

- Definitions
- What is it about –Asthma and Wheeze
-
- How do we manage them?
-
- What is in between?
- Costs in practice
- Conclusions

What is Asthma

- Asthma as a heterogeneous disease (with different underlying disease processes) characterised by chronic airway inflammation
  - History of respiratory symptoms i.e. cough of variable time and intensity, tightness of the chest, wheeze and shortness of breath. These symptoms are worse at night or with viral infections, and trigger factors include exercise, allergens, emotions and cold air.Physical examination which is often normal but not limited to wheezing, a silent chest and at times signs of respiratory failure.

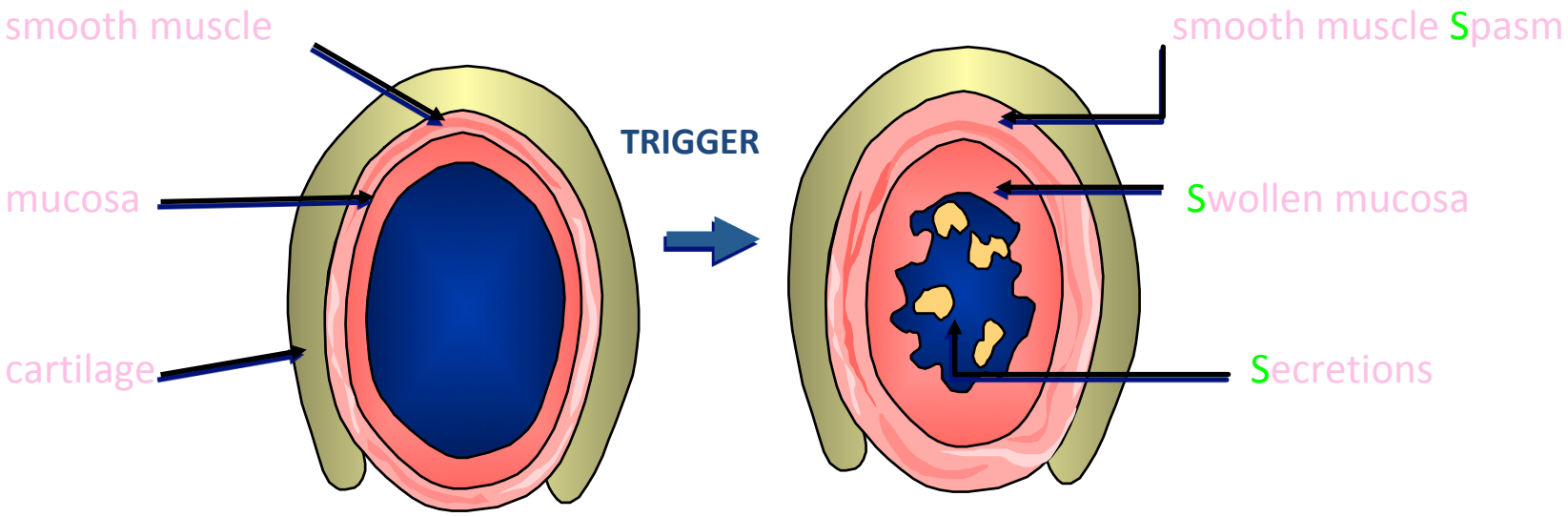
-Evidence of variable reversible airflow limitation.

AIRWAY INFLAMMATION

Cross-section of Normal Airway

Cross-section of Inflamed Airway

the 3 “S”s:-



Airways become irritable and narrow

Cause of Wheezing

- Not from obstruction of small airways – Surface area too large

- From increased intrathoracic pressure + decreased large airway pressure = vibration of airway wall in large airways (Generations 1-5)

	Name	Division	Diameter (mm)	How many?	Cross-sectional area (cm^2)
Conducting system	Trachea	0	15-22	1	2.5
	Primary bronchi	1	10-15	2	↓
	Smaller bronchi	2	1-10	4	↓
		3		↓	↓
		4		↓	↓
		5		↓	↓
		6-11		1×10^4	↓
Exchange surface	Bronchioles	12-23	0.5-1	2×10^4 ↓ 8×10^7	100 ↓ 5×10^3
	Alveoli	24	0.3	$3\text{-}6 \times 10^8$	$>1 \times 10^6$

Airway Diameter
Trachea 20 mm
< 2mm
Conducting Zone
Respiratory Zone
Airway Generation
0
5
16
23
Cross Section Area
3
cm²
500

Air Trapping

- Hyper-inflated chest
- Barrel shaped
- Loss of cardiac dullness
- Liver pushed down
- Hoover sign

Hoover Sign

- Normal diaphragm movement
- Hyperinflation = diaphragm flattened
- Diaphragm contraction = paradoxical inward movement of lower intercostal area during inspiration

What is the prevalence of wheeze and asthma

- Asthma:
  - 1979- Rural 0.01% vs Urban 3.1%(7-9yrs)
  - 2003-Rural 9% vs Urban 15%
  - Currently worldwide:6-7yrs(11.5%), 13-14yrs(14.1%) ISAAC III

- Wheeze:
  - 12month prevalence incr 16-20.3% (CT),Polokoane-18%
  - <5yrs: ¼ persistent symptoms and develop asthma
  - Rhino-conjuctivitis incr wheeze by 107%

What are we doing wrong?

- Excellent: EML

World ranking

Prevalence -25th

Mortality- 4th

Case fatality-5th (18.5 per 100 000asthmatics)

Asthma is a chronic inflammatory disorder

Airway inflammation leads to

- ✓ ***Hyper responsiveness*** - responses to triggers

- ✓ ***Obstruction*** - usually fully reversible

- ✓ ***Symptoms*** – cough, wheeze, dyspnoea

- ✓ While symptoms are easily appreciated, symptoms are <u>not</u> the fundamental aspect of asthma

National Asthma Education and Prevention Program. Highlights *of the Expert panel Report 2*

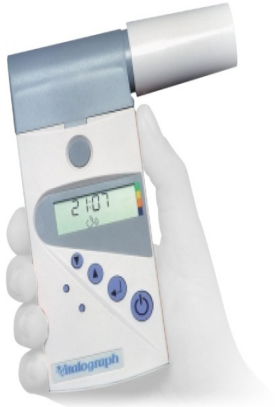
Guidelines for the diagnosis and management of asthma. Bethesda, MD.,Feb 2002 NIH Publication No 02-3659

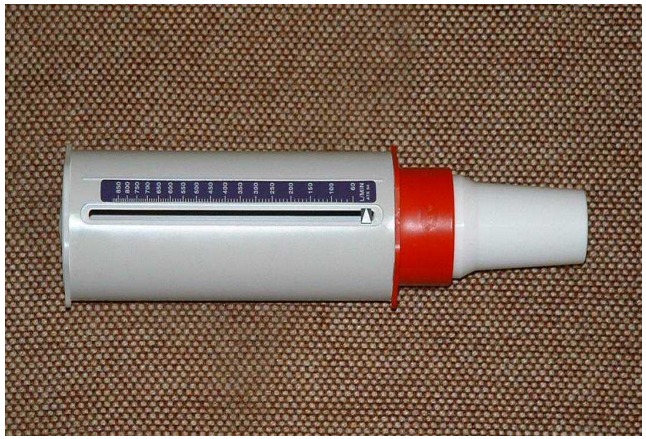
Risk factors

- Eczema
  - 30-50% of children develop asthma
  - SA-39%-Symptoms ISAAC questionnaire
  - 29% diagnosed by Dr
- Air pollution
  - KZN- 32% symptoms
  - 13-16.5%-Dr diagnosed
  - 21% Marked BHR on methacholine
- ETS

Diagnosis

- Asthma-clinical diagnosis
- Modified bronchodilator test
- Exercise challenge test
- Allergy testing





Asthma Diary

NAME .....

MEDICATION / DOSE .....

.....

CONTROLLER / PREVENTER .....

.....

RELIEVER / EMERGENCY PUMP .....

.....

OTHER .....

.....

SOUTH AFRICAN THORACIC SOCIETY

NATIONAL ASTHMA EDUCATION PROGRAMME

ALLSA

MONTH: _____

SYMPTOMS		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Cough - Day																																
Cough - Night																																
Wheeze / tight chest																																
Used reliever																																
Clinic / Hospital visit for nebuliser																																
Controller	Day																															
	Night																															
Other	Day																															
	Night																															

MONTH: _____

SYMPTOMS		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
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Controller	Day																															
	Night																															
Other	Day																															
	Night																															

MONTH: _____

SYMPTOMS		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
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Clinic / Hospital visit for nebuliser																																
Controller	Day																															
	Night																															
Other	Day																															
	Night																															

Initiate treatment

- Severity-RR incr req O2
- Freq -3 wheezes/yr symptoms>10days
- Association with allergens, worsening of symptoms @night
- Reversibility- Level D
- Positive fam history –atopy level B

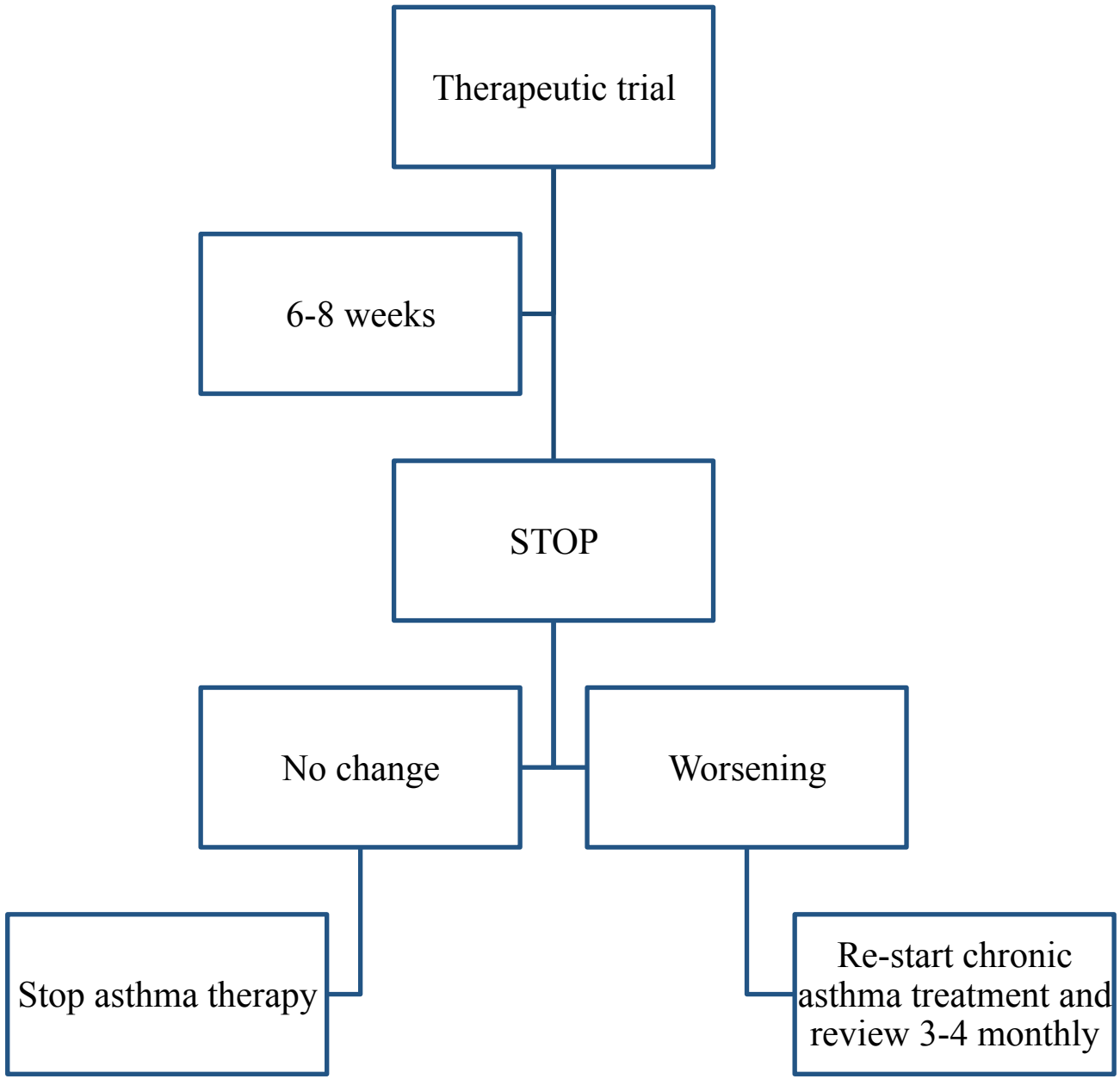
Therapeutic trial
6-8 weeks
STOP
No change
Worsening
Stop asthma therapy
Re-start chronic asthma treatment and review 3-4 monthly

Table 2. Diagnostic characteristics of asthma in children <5 years of age and grade of recommendation*

Characteristics	Grade
Exercise-/activity-induced symptoms	A
Nocturnal coughing (problematic, with awakening)	
Symptoms persisting in children >3 years old	
Response to a bronchodilator (short-acting beta-agonist)	B
No seasonal variation in symptoms	
Viral colds with accompanying chest involvement	
Symptoms with specific trigger exposure, including emotional upsets (e.g. crying and laughing)	
Response to a short course of oral corticosteroids during acute exacerbation of symptoms	
Comorbid allergic rhinitis, proven food allergy and atopic dermatitis	
Absence of seasonal variation	
Wheezing lasting >1 month	C
A positive modified bronchodilator test	D

*Adapted from Global Initiative for Asthma.[3]

Table 5. Asthma treatment options for children 2 – 5 years of age

Step 1	
Intermittent reliever therapy	SABA as needed
Step 2	
Low-dose controller and as-needed reliever medication	Low-dose ICS Intermittent ICS (second choice if seasonal symptoms) LTRA
Step 3	
Additional controller and as-needed reliever medication	Medium-dose ICS Low-dose ICS and LTRA
Step 4	
Refer to specialist (paediatrician, paediatric allergologist or paediatric pulmonologist)	

SABA = short-acting beta$_2$-agonist; ICS = inhaled corticosteroid; LTRA = leukotriene receptor antagonist.

Table 6. Asthma treatment options for children ≥6 years old

Step 1	
Intermittent reliever therapy	SABA as needed
Step 2	
Low-dose controller and as-needed reliever medication	Low-dose ICS
Step 3	
Additional controller and as-needed reliever medication	Low-dose ICS/LABA combination therapy (first choice) Medium-dose ICS (second choice)
Step 4	
≥2 controllers and as-needed reliever medication	Low-dose ICS/LABA and LTRA Medium-dose ICS and LABA Tiotropium (>12 years of age) – add to step 3 drugs Theophylline (>12 years of age)
Step 5	
Refer to specialist (paediatrician, paediatric allergologist or paediatric pulmonologist)	

SABA = short-acting beta$_2$-agonist; ICS = inhaled corticosteroid; LABA = long-acting beta$_2$-agonist; LTRA = leukotriene receptor antagonist.

Stepping down treatment once Asthma is controlled

Current step	Current medication and dose	Options for stepping down	Evidence
Step 5	**High dose ICS/LABA plus oral corticosteroids (OCS)**	• **Continue high code ICS/LABA and reduce OCS dose** • **Use sputum-guided approach to reducing OCS** • **Alternate-day OCS treatment** • **Replace OCS with high dose OCS**	**D** **B** **D** **D**
	High dose ICS/LABA plus other add-on agents	• **Refer for expert advice**	**D**
Step 4	**Moderate to high dose ICS/LABA maintenance treatment**	• **Continue combination ICS/LABA with 50% reduction in ICS components , by sung available formulas** • **Discontinuing LABA is more likely to lead to deterioration**	**B** **A**
	Medium dose ICS /formoterol as maintenance and reliever	• **Reduce maintenance ICS/formoterol* to low dose, and continue as needed low dose ICS/ formoterol* reliever**	**D**
	High dose ICS plus second controller	• **Reduce ICS dose by 50% and continue second controller**	**B**
Step 3	**Low dose ICS/LABA maintenance**	• **Reduce ICS/LABA to once a daily** • **Discontinuing LABA is more likely to lead to deterioration**	**D** **A**
	Low dose ICS/formoterol* as maintenance and reliever	• **Reduce maintenance ICS/formoterol* dose to once daily and continue as-needed low dose ICS/formoterol* relieve**	**C**
	Moderate-or high –dose ICS	• **Reduce ICS dose by 50%**	**A**
Step 2	**Low dose ICS**	• **Once –daily dosing (budesonide, ciclesonide, mometasone)**	**A**
	Low dose ICS or LTRA	• **Consider stopping controller treatment only if there have been no symptoms for 6-12 months, and patient has no risk factors (Box 2-2, p17). Provide a written asthma action plan, and monitor closely.** • **Complete cessation of ICS in adults is not advised as the risk of exacerbations is increased.**	**D** **A**

Adapted from Pocket guide for asthma management and prevention for adults and children older than 5years (updated 2016). GINA guidelines.

Education

- Programmes-improve control, QOL, PFT, decr hosp:Level A
- Influence effective mod severe> mild mod asthma: Level A
- Written plans more effective than oral plans-Level A
- Follow up> Emergency-Level A
- Asthma action plan- no effect on PFT BUT: fewer night symptoms, ER visits, less rescue meds, less loss of time from work/school, better QOL: Level A


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next course starts
March 2019
brought to you by
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EDUCATIONAL PROGRAMME
Cost of course: R4 000 per candidate
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A meta-analysis of montelukast for recurrent wheeze in preschool children

Eur J Pediatr. 2017 Jul;176(7):963-969

- Primary endpoint examined was frequency of wheezing episodes
- Five trials containing 3960 patients with a preschool wheezing disorder were analysed. Meta-analyses of studies of intermittent montelukast showed no benefit in preventing episodes of wheeze
- **CONCLUSIONS:**

This review highlights that the currently available evidence does not support the use of montelukast in preschool children with recurrent wheeze. It does not help preventing wheezing episodes or reducing unscheduled medical attendances

A specific montelukast responder phenotype may exist, but such patients should be sought in larger multicentre RCTs.

Stories doing rounds in practice

- Probiotics

Probiotic supplementation during pregnancy or infancy for the prevention of asthma and wheeze: systematic review and meta-analysis. BMJ. 2013 Dec 4

OBJECTIVE:To evaluate the association of probiotic supplementation during pregnancy or infancy with childhood asthma and wheeze

CONCLUSIONS:

We found no evidence to support a protective association between perinatal use of probiotics and doctor diagnosed asthma or childhood wheeze.

Association between probiotic supplementation and asthma incidence in infants: a meta-analysis of randomized controlled trials. J Asthma. 2019 Jan 18:1-12

OBJECTIVE: We performed a meta-analysis of RCTs to investigate whether probiotics are associated with a lower asthma incidence in infants.

CONCLUSIONS:

The use of probiotic supplementation compared with placebo was not associated with a lower risk of asthma in infants. These findings do not support recommendation to use probiotics in the prevention of asthma in infants.

- Vit D

Vitamin D for the management of asthma**.** Cochrane Database Syst Rev. 2016 Sep

OBJECTIVES: To evaluate the efficacy of administration of vitamin D and its hydroxylated metabolites in reducing the risk of severe asthma exacerbations (defined as those requiring treatment with systemic corticosteroids) and improving asthma symptom control.

AUTHORS' CONCLUSIONS:

Meta-analysis of a modest number of trials in people with predominantly mild to moderate asthma suggests that vitamin D is likely to reduce both the risk of severe asthma exacerbation and healthcare use. It is as yet unclear whether these effects are confined to people with lower baseline vitamin D status; further research, including individual patient data meta-analysis of existing datasets, is needed to clarify this issue. Children and people with frequent severe asthma exacerbations were under-represented; additional primary trials are needed to establish whether vitamin D can reduce the risk of severe asthma exacerbation in these groups.

- **Early life vitamin D status and asthma and wheeze: a systematic review and meta-analysis.** BMC Pulm Med. 2018 Jul 20;18(1)

BACKGROUND:

Vitamin D deficiency has been linked to an increased risk of asthma. This study aimed to quantify the effect of early life vitamin D status on asthma and wheeze later in life.

CONCLUSIONS:

The pooled estimates from cohort studies show **no association between antenatal blood vitamin D level and asthma/wheeze in later life. Further trials with enough power and longer follow-up time should be conducted to confirm the results.**

- **Vitamin D and childhood asthma: causation and contribution to disease activity.** Curr Opin Allergy Clin Immunol. 2019 Jan2

To review the literature of the past 18 months (April 2017 through September, 2018) relating to vitamin D and childhood asthma.

SUMMARY:

Evidence continues to accumulate that **vitamin D supplementation helps to prevent the development of asthma and recurrent wheeze in early life**, and may also help in the management of asthma. The **level(s) of circulating vitamin D that maximizes these effects remains to be identified.**

- **Impact of two oral doses of 100,000 IU of vitamin D_3 in preschoolers with viral-induced asthma: a pilot randomised controlled trial.**

Trials. 2019 Feb 18;20(1):138

The objective was to ascertain the **efficacy of high-dose vitamin D_3** in increasing serum vitamin D in preschoolers with asthma and provide preliminary data on **safety and efficacy outcomes**.

Two oral boluses of 100,000 IU vitamin D_3 once in the fall and once in the winter, **rapidly, safely, and significantly raises overall serum vitamin D metabolites**. However, it is sufficient to maintain 25OHD ≥ 75 nmol/L throughout 7 months in only slightly more than half of participants.

Asthma Treatment

ALLSA

SOUTH AFRICAN THORACIC SOCIETY

CONTROLLERS

CONTROLLERS should be used every day - even if you are well and don't have any symptoms.

When used daily, controllers will control the inflammation in your lungs. By controlling the inflammation in your lungs, your symptoms (for example coughing, wheezing, a tight chest or waking at night) will become less and can even disappear.

Alvesco® HFA MDI
Aerosol
Ciclesonide
80 & 160 µg per dose
Astra Zeneca

Asmanex Twisthaler®
Dry powder inhaler
Mometasone furoate anhydrous
200 & 400 µg per dose
MSD

Beclate® HFA MDI
Aerosol
Beclomethasone dipropionate
50, 100 & 200 µg per dose
Cipla

Budeflam® HFA MDI
Aerosol
Budesonide
100 & 200 µg per dose
Cipla

Budeflam® HFA MDI
Aerosol Gentlehaler
Budesonide
100 & 200 µg per dose
Cipla

Ciclovent 80
Aerosol
Ciclesonide
80 µg per dose
Cipla

Ciclovent 160
Aerosol
Ciclesonide
160 µg per dose
Cipla

Flixotide Accuhaler®
Dry powder inhaler
Fluticasone propionate
50, 125, 250 & 500 µg per dose
GSK, Aspen Pharmacare

Flixotide® HFA MDI
Aerosol
Fluticasone propionate
50, 125 & 250 µg per dose
GSK, Aspen Pharmacare

Pulmicort Turbuhaler®
Dry powder inhaler
Budesonide
100, 200 & 400 µg per dose
Astra Zeneca

ANTI-INFLAMMATORIES

Inhaled corticosteroids are the most effective controller treatment for asthma. Leukotriene receptor antagonists may be used as monotherapy in mild-moderate asthma and as add-on therapy (particularly for children under the age of 5 years).

Accolate®
Tablets
Zafirlukast
20 mg tablets
Astra Zeneca

Monte-Air®
Tablets
Montelukast
4,5 & 10 mg per dose
MSD

Monte-Air Sprinkles®
Tablets
Montelukast
4,5 & 10 mg per dose
MSD

Singulair®
Sprinkles and Tablets
Montelukast
4, 5 & 10 mg per dose
MSD

Sintrine™
Tablets
Montelukast Sodium
4,5 & 10 mg per dose
Sandoz

Topraz®
Tablets
Montelukast
4,5 & 10 mg per dose
Dr Reddy's

LONG-ACTING BRONCHODILATORS

Long acting bronchodilators are never used on their own as monotherapy. They may be considered for step-up therapy for children older than 5 years, or adults where asthma is uncontrolled with corticosteroids.

Foradil®
Aerolizer
Formoterol fumarate
12 µg per dose
Novartis

Oxis Turbuhaler®
Dry powder inhaler
Formoterol fumarate
9 µg per dose
Astra Zeneca

Serevent® Accuhaler®
Dry powder inhaler
Salmeterol Xinafoate
50 µg per dose
GSK, Aspen Pharmacare

Serevent® HFA MDI
Aerosol
Salmeterol Xinafoate
25 µg per dose
GSK, Aspen Pharmacare

Foratec® HFA MDI
Aerosol
Formoterol fumarate
12 µg per dose
Cipla

COMBINATION MEDICATIONS

Combination products may be considered for step-up therapy for children older than 5 years, or adults where asthma is uncontrolled with inhaled corticosteroids.

Dulera®
Aerosol
Mometasone Furoate &
Formoterol Fumarate Dihydrate
100/5 µg and 200/5 µg per dose
MSD

Foxair™ Accuhaler®
Dry powder inhaler
Salmeterol Xinafoate /
Fluticasone Propionate
50/100, 50/250 & 50/500 µg per dose
GSK, Aspen Pharmacare

Foxair™ HFA MDI
Aerosol
Salmeterol Xinafoate /
Fluticasone Propionate
25/50, 25/125 &
25/250 µg per dose
GSK, Aspen Pharmacare

Innuvair™ pMDI
Aerosol
Beclomethasone
Dipropionate / Formoterol 100µg
Beclomethasone and
6 µg Formoterol
Adcock Ingram

Relvar™Ellipta®
Dry powder inhaler
Fluticasone
furoate / vilanterol
92/22 /
184/22 µg per dose
GSK, Aspen Pharmacare

Sereflo® HFA MDI
Aerosol
Salmeterol/
Fluticasone Propionate
25 Salmeterol and
50,125 & 250 µg
fluticasone per dose
Cipla

Sereflo Synchrobreathe®
Aerosol
Salmeterol/
Fluticasone Propionate
25 Salmeterol and
50,125 & 250 µg
fluticasone per dose
Cipla

Seretide® Accuhaler®
Dry powder inhaler
Salmeterol Xinafoate /
Fluticasone Propionate
50/100, 50/250 &
50/500 µg per dose
GSK, Aspen Pharmacare

Seretide® HFA MDI
Aerosol
Salmeterol Xinafoate/
Fluticasone Propionate
25/50, 25/125 &
25/250 µg per dose
GSK, Aspen Pharmacare

Symbicord Turbuhaler®
Dry powder inhaler
Budesonide / Formoterol
Fumarate Dihydrate
160/4.5 µg: 320/9 µg;
80/4.5 µg per dose
Astra Zeneca

Vannair®pMDI
Aerosol
Budesonide/formoterol
Fumarate Dihydrate
80/4.5 µg & 160/4.5 µg per dose
Astra Zeneca

RELIEVERS

RELIEVERS are only used when you have symptoms (as an emergency measure to open up a tight chest). If the inflammation in your lungs is not well controlled, your symptoms will increase. The number of times you need to use your reliever is, therefore, an indication of whether or not your chest inflammation is under control.

If you need to use a reliever more than twice a week, your asthma is not well controlled.

Consult with your doctor about your medication and technique, to check if you are getting enough controller medication. If you are getting enough controller, your symptoms (for example coughing, wheezing, a tight chest or waking at night) will become less and can even disappear.

Asthavent® HFA MDI
Aerosol
Salbutamol
100 µg per dose
Cipla

Atrovent® HFA MDI
Aerosol
Ipratropium Bromide
20µg per dose
Ing. Pharm

Berotec® HFA MDI
Aerosol
Fenoterol Hydrobromide
100 µg per dose
Ing. Pharm

Bricanyl Turbuhaler®
Dry powder inhaler
Terbutaline Sulphate
500µg per dose
Astra Zeneca

Combivent® HFA MDI
Aerosol
Salbutamol 100 µg and
Ipratropium Bromide 20 µg per dose
Ing. Pharm

Duolin HFA
Aerosol
Ipratropium bromide 20 µg
Salbutamol 100 µg
Cipla

Duovent® HFA MDI
Aerosol
Fenoterol Hydrobromide 50µg and
Ipratropium Bromide 20µg per dose
Ing. Pharm

Ipvent® HFA MDI
Aerosol
Ipratropium Bromide
40 µg per dose
Cipla

Venteze® HFA MDI
Aerosol
Salbutamol
100 µg per dose
Aspen Pharmacare

Ventolin Accuhaler®
Dry powder inhaler
Salbutamol Sulphate
200 µg per dose
Aspen Pharmacare

Ventolin® HFA MDI
Aerosol
Salbutamol Sulphate
100 µg per dose
Aspen Pharmacare

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NATIONAL ASTHMA EDUCATION PROGRAMME

Table 1. Differential diagnosis of wheeze in children <5 years of age*

Category	Disease entity
Congenital upper airway	Complete tracheal rings
	Tracheomalacia
	Laryngomalacia
	Vocal cord palsy/paresis
	Subglottic stenosis/post-intubation/ congenital
Congenital lower airway	Vascular rings/slings
	Bronchomalacia
Aspiration	Gastroesophageal reflux disease
	Swallowing inco-ordination
	Laryngeal cleft
	Tracheo-oesophageal fistula
Bronchiectasis	Cystic fibrosis
	Primary ciliary dyskinesia
	Persistent bacterial bronchitis
	Primary immunodeficiency
	HIV
Endobronchial lesions	Foreign body
	Tuberculosis granuloma
	Malignancies
Cardiac	Enlarged heart
	Congenital heart disease (left-to-right shunts)

*Adapted from White *et al*.[5]

Differential Diagnosis of asthma in children 6-11 years of age

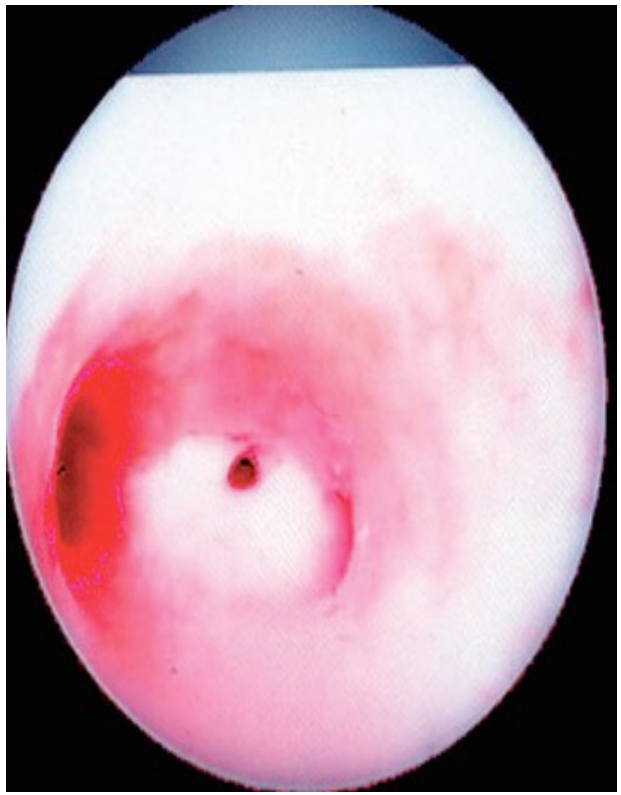
Condition	Symptoms
1. Chronic upper airway cough syndrome	Sneezing, itching, blocked nose, throat-clearing
1. Inhaled foreign body	Sudden onset of symptoms, unilateral wheeze
1. Bronchiectasis	Recurrent infections, productive cough
1. Primary ciliary dyskinesia	Recurrent infections, productive cough, sinusitis
1. Congenital heart disease	Cardiac murmurs
1. Bronchopulmonary dysplasia	Pre-term delivery, symptoms since birth
1. Cystic fibrosis	Excessive cough and mucus production, gastrointestinal symptoms

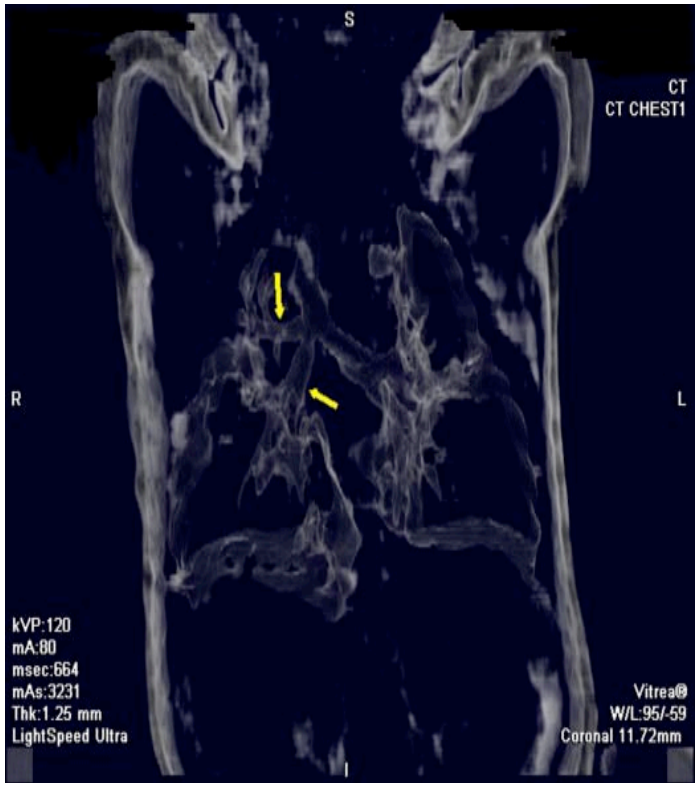
Adapted from Pocket guide for asthma management and prevention for adults and children older than 5years (updated 2016). GINA guidelines.

What is in between?

Bronchial Anomalies in VACTERL Association.

Adaobi Kanu, MD,David Tegay, DO, and Richard Scriven, MD.Pediatric Pulmonology 43:930–932 (2008)

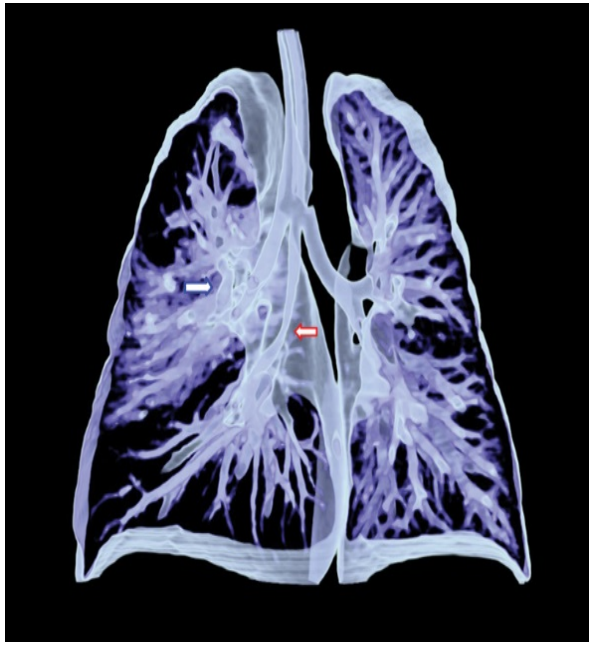


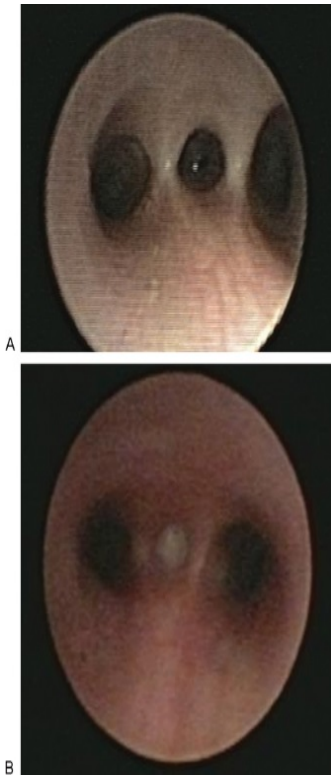


Congenital trifurcation of the trachea.

European J Pediatr Surg Rep. 2014 Jun;2(1):35-7. doi: 10.1055/s-0033-1353367. Epub 2013 Sep 9

Kiarash Taghavi ET AL.





Costs

	LAB A	LAB B	LAB C
Multiplex PCR	**R 2665.60**	**R 2180.00**	**R 3858.80**
FBC	R 226.80	R 231.00	R 328.20
UE	R 346.00	R 355.00	R 500.60
CRP	R 192.50	R 196.00	R 278.60

Nebs in casualty- 7am-5pm R550
-5pm to 7am R950

CXR- 8am to 6pm R650
-6pm to 8am R 800


Pulmicort
0,25 mg/ml
DUOLIN
aspelone
Tussi
ADCO-
linctopent
syrup
iliadin
2013 Calendar

Conclusions

- Oral steroids: o.5-1mg/kg for 3/7
- Start Rx and stop if no response
- Use age appropriate therapy
- All that wheeze is not asthma
- Think about costs
- Education, education, education
- Join NAEP and ask your patient to join