NHS
Vale of York
Clinical Commissioning Group

NHS
York and Scarborough
Teaching Hospitals
NHS Foundation Trust

Referral Support Service

Paediatrics

PA23 Asthma in Children

Definition

A long-term condition affecting both children and adults. Inflammation and narrowing of the small airways in the lungs cause asthma symptoms, such as cough, wheeze, shortness of breath and chest tightness

Paediatric Normal Values (adapted from APLS)			
Age	Resp Rate	Heart Rate	Systolic BP
Neonate <4w	40-60	120-160	>60
Infant <1 y	30-40	110-160	70-90
Toddler 1-2 yrs	25-35	100-150	75-95
2-5 yrs	25-30	95-140	85-100

General Points

- Most common chronic disease among children
- Acute wheeze is one of the most common reasons for emergency department attendance and hospital admission in children
- Triggers can include viral infections, dust, smoke, fumes, changes in the weather, grass and tree pollen, animal fur and feathers, strong soap and perfume
- Symptoms are intermittent and often worse at night or during exercise
- It is more likely in people who have other allergic conditions, such as eczema and rhinitis
- Early life factors can increase risk of asthma such as low-birth weight, prematurity, tobacco exposure and air pollution
- Overweight or obese individuals are at a greater risk of asthma
- Each year, there are still a small proportion of avoidable deaths in children and young people resulting from asthma

Differential Diagnoses

It is important to differentiate between viral induced wheeze, other causes of wheeze and asthma.

- **Pneumonia**: pyrexia >38.5°C, productive cough, asymmetry on auscultation
- **Epiglottitis**: dysphagia, drooling
- **Croup**: inspiratory stridor
- **Hyperventilation**: breathlessness with light headedness and peripheral tingling
- **Foreign body**: localized wheeze and reduced air entry
- **GORD**: excessive vomiting
- **Anaphylaxis**

Assessment

Diagnosis is based on the recognition of a characteristic pattern of respiratory symptoms, signs and test results and the absence of any alternative explanation for these.

Making the diagnosis

Asthma should be confirmed when the child is able to undergo objective testing, usually over the age of 5 years.

Supportive Investigations	
Spirometry	<FEV_1/FVC ration <70%
Bronchodilator reversibility	Improvement in FEV_1 of ≥ 12%
Peak flow variability	Peak expiratory flow variability >20% over a 2-4 week period
Exhaled nitric oxide 'FeNO'	FeNO >35ppb

Chronic Management

Key Principles

- Start treatment at the step most appropriate to initial symptom severity
- Check adherence and inhaler technique and reconsider diagnosis if poor response
- Aim is to achieve early control and maintain at lower possible dose
- Step treatment up and down accordingly
- Use of 6 short acting bronchodilator devices in 12 months should be considered for review
- Those using ≥ 12 in 12 months should be invited for an urgent review, this is associated with an increased risk of asthma death
- Provide patients with a personalised patient action plain
- Weight-loss interventions can be considered for overweight and obese children with asthma to improve control

Inhalation Device

- For children >5y: pMDI + **spacer** is first choice inhalation device for ICS.
- For SABA, consideration should be given to a wider range of devices. However, children should always have access to Salbutamol pMDI and spacer, in the event of a significant asthma attack.
- >5y use mouthpiece instead of mask (providing technique is good)
- Patients should be given adequate training in the use of the inhalation device
- Clean spacers once a month with mild detergent and allow to air dry. Replace every 6-12months.
- Consideration should be made to the carbon footprint of inhalation devices. DPIs are less harmful than pMDI and should be used when clinically appropriate.

In brief to achieve optimum lung deposition, the inspiratory effort should be
pMDI: SLOW AND STEADY, using a spacer device
DPI: QUICK AND DEEP

Intermittent Reliever Therapy

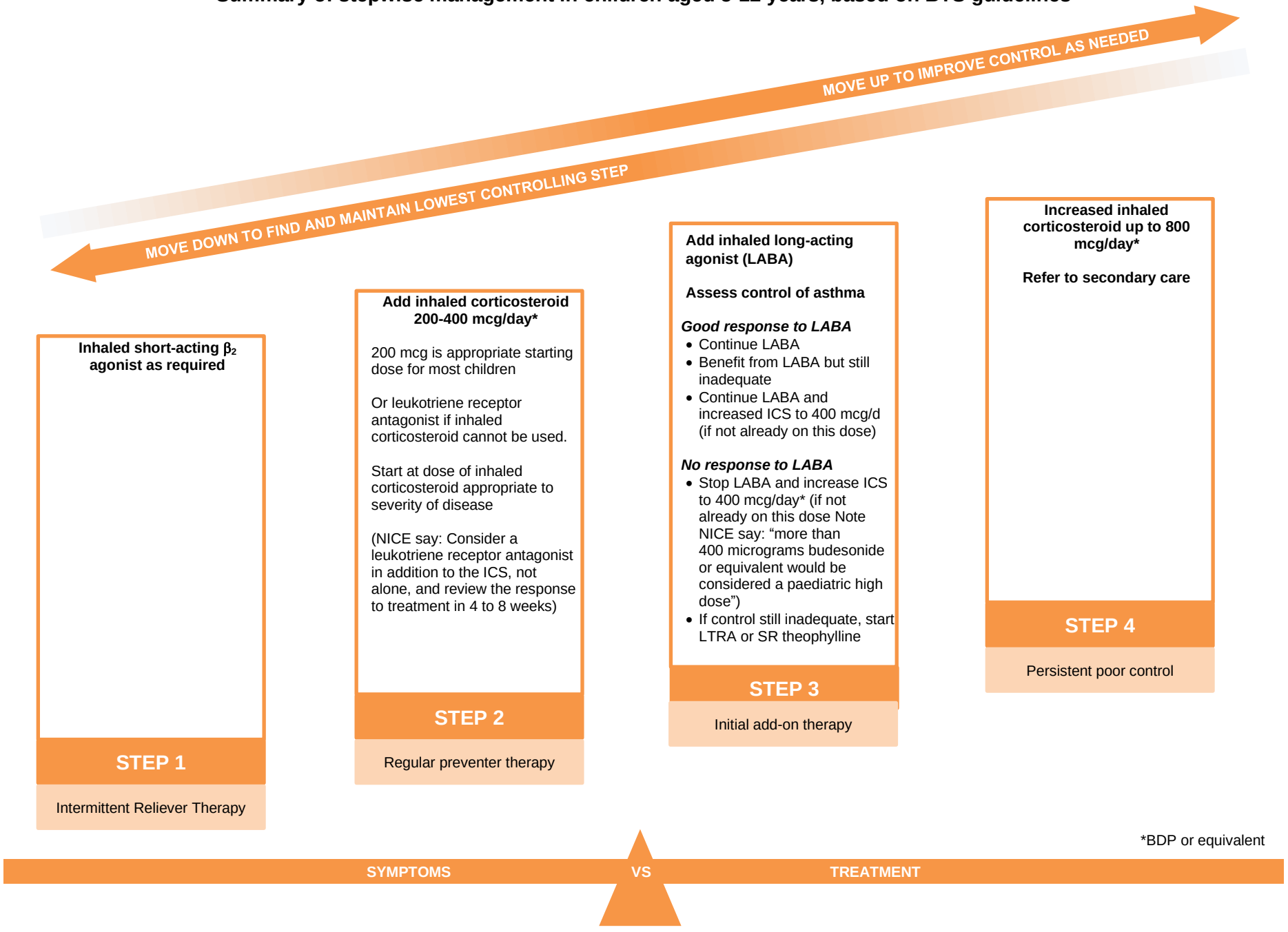
- Children should be prescribed a short-acting bronchodilator to relieve symptoms
- For those with infrequent short-lived symptoms, occasional use of reliever may be all that's required

Short acting beta$_2$ agonists (SABAs)

Salbutamol

- Child, by aerosol inhalation: 100–200 micrograms (1–2 puffs); for persistent symptoms as per personalised asthma action plan.

Summary of stepwise management in children aged 5-12 years, based on BTS guidelines



Regular Preventer Therapy

Inhaled Corticosteroids

- Trial any change involving an inhaled corticosteroid for at least 6 weeks
- ICS are the most effective preventer drug for achieving overall treatment goals
- In mild to moderate asthma in children, a usual starting dose total BDP 200 micrograms /d or equivalent

IMPORTANT
Consider ICS with any of the following

- Using inhaled SABA ≥ 3x/week
- Symptomatic ≥ 3x/week
- Waking with symptoms one night/week
- An exacerbation requiring oral corticosteroids in the last 2 years

Beclometasone Dipropionate

Clenil Modulite: aerosol inhalation
50 mcg/dose inhaler and 100 mcg/dose inhaler; are licensed for use in children
200 mcg/dose inhaler and 250mcg/dose inhalers; are not licensed for use in children

- 5-11y: 100-200 micrograms twice daily
- >12y: 200-400 micrograms twice daily

Budesonide

Pulmicort Turbohaler (DPI): dry powder inhaler 100 mcg/dose, 200 mcg/dose, 400 mcg/dose

- 5-12y: 100-400 micrograms twice daily
- >12y: 100-800 micrograms twice daily

Other preparations less commonly used include Soprobec and Qvar.
Qvar® has extra-fine particles, is more potent than traditional beclometasone dipropionate CFC-containing inhalers and is approximately twice as potent as Clenil Modulite®.

Initial Add-on Therapy

- Not all brands and strengths of ICS/LABA inhalers are licensed for use under 18 years
- DO NOT prescribe LABA without ICS preventer treatment

<2y: consider referral to secondary care
2-5y: consider LTRA as initial add on therapy
5-12y: an inhaled LABA can be considered as initial add on therapy, or LTRA

Combination ICS/LABA Inhalers

Fluticasone propionate/salmeterol

Seretide 50 Evohaler (pMDI):
50/25 is only for use in children

- 4-17y: 2 puffs BD, reduced to 2 puffs once daily if control is maintained

Seretide 100 Accuhaler (DPI):
100/50: medium dose ICS should only be used in children <12y after referral to secondary care

- 4-17y: 1 puff BD, reduced to 1 puff once daily if control is maintained

Budesonide/formoterol

Symbicort Turbohaler:
100/6 is licensed for children aged 6 years and above
200/6 is licensed for children aged 12 years and above

- 6-17y: 1-2 puffs twice daily, reduced to 1 puff daily if control is maintained
- >12y: 200-400 micrograms twice daily

Leukotriene receptor antagonists (LTRAs)

Montelukast:
Consider if exercise induced asthma is a specific problem in a patient otherwise well controlled. Trial treatment for 4 weeks, if no benefit then discontinue. Risk of neuropsychiatric reactions such as speech impairment (stuttering) and obsessive-compulsive symptoms

- Tablets 10mg
- Chewable tablets 4mg, 5mg
- Granules 4mg

- 6m-5y: 4mg once daily in the evening
- 6-14y: 5mg once daily in the evening

Monitoring

- Conduct a routine clinical review annually
- Check inhaler technique and adherence – VERY IMPORTANT
- Assess current symptom control; symptoms, limitation on activity and use of rescue medication
- Impact on daily activities include sport, play and social life
- Asthma attacks
- Oral corticosteroid use
- Time off school
- Review personalised patient action plan
- Exposure to tobacco smoke
- Growth (height and weight) annually

Indications for Referral

- Two or more courses of systemic corticosteroids in the previous 12 months
- Require treatment step 4 to achieve control
- Medium dose ICS (total beclomethasone 800 mcg/d or equivalent) should only be used after referred to secondary care
- Diagnosis unclear

Information to include in referral letter

- Exacerbation history: number of exacerbations in past 12 months
- Number of courses of oral steroids in past 12 months
- History of atopy: include any known triggers
- Current medication
- If possible a recent peak flow record with symptom diary over two weeks

Patient information leaflets/ PDAs

Patient.info/chest-lungs/asthma-leaflet
Oxfordhealth.nhs.uk/Asthma-advice-for-children

Personalised Patient Action Plan

Child

Asthma.org.uk/children/my-asthma-plan-2021

Young Person

Asthma.org.uk/health-advice/resources/adults/asthma-action-plan

References

- National Institute for Clinical Excellent [NICE] (2020) *Asthma: Diagnosis, monitoring and chronic asthma management* [Viewed 16 Aug 2021]
- British Thoracic Society/Scottish Intercollegiate Guidelines Network 2019. *British guidelines on management of asthma.* [online]
- Royal College of Physicians of London, British Thoracic Society and British Lung Foundation. *Why asthma skill kills: The national review of asthma deaths (NRAD). Confidential enquiry report.* London (2015) [Viewed 16 Aug 2021] https://www.rcplondon.ac.uk/projects/outputs/why-asthma-still-kills
- National Institute for Clinical Excellent [NICE] (2021) *Asthma – Clinical Knowledge Summaries.*[Viewed 16 Aug 2021]

Appendix

Brand: All inhalers to be prescribed by brand especially combination inhalers
Spacer: Replace once a year
Combination inhalers: Recommended to ensure long action β_2 agonist is not taken without inhaled corticosteroid

MEDICATION	BRAND	DEVICE	TYPE	DOSES	CO_2eq (g)	Cost (£)	BDP 200	BDP 400	BDP 800	License
SHORT ACTING BETA 2 AGONIST (SABA)										
Salbutamol 100 mcg	Ventolin	Evohaler pMDI		200						
	Salamol	CFC-free								
	Salbutamol Easyhaler	Easyhaler	DPI	200						
	Airomir	Autohaler		200		6.02				
	Salamol	Easi-breathe		200		6.30				
	Ventolin	Accuhaler		60						
INHALED CORTICOSTEROIDS										
Beclometasone Dipropionate	Clenil Modulite 50 mcg	pMDI	pMDI	200	101.75		2 puffs BD			Child
	Clenil Modulite 100 mcg	pMDI	pMDI	200	101.75			1 puffs BD		Child
	Clenil Modulite 200 mcg	pMDI	pMDI	200	101.75	16.17			2 puffs BD	Not for children
	Qvar 50 mcg	pMDI	pMDI	200	101.75	17.21		2 puffs BD		≥ 5y
	Qvar 50 mcg	Autohaler	BAI		101.75	17.21		2 puffs BD		≥ 5y
	Qvar 50 mcg	Easi-breathe	BAI		101.75	16.95		2 puffs BD		≥ 5y
	Qvar 100 mcg	pMDI	pMDI	200	101.75	17.21			2 puffs BD	≥ 5y
	Qvar 100 mcg	Autohaler	BAI		101.75	17.21			2 puffs BD	≥ 5y
	Qvar 100 mcg	Easi-breathe	BAI		101.75	16.95			2 puffs BD	≥ 5y
	Soprobec	Cfc-free pMDI								Child
Budesonide (first line)	Pulmicort 100 mcg	Turbohaler	DPI	200	18.75	14.25	1 puff BD	2 puffs BD		≥ 5y
	Pulmicort 200 mcg	Turbohaler	DPI	200	18.75	14.25		1 puff BD	2 puffs BD	≥ 5y
	Pulmicort 400 mcg	Turbohaler	DPI	200	18.75	14.25			1 puff BD	≥ 5y
COMBINATION INHALED CORTICOSTEROID AND LONG ACTING BETA-2 AGONIST										
Budesonide & Formoterol	Symbicort 100/6	Turbohaler	DPI	120	18.75		1 puff BD	2 puffs BD		≥ 6y
Fluticasone propionate & Salmeterol	Seretide 100/50	Accuhaler	DPI	60	18.75			1 puff BD		Only use <12y after secondary care referral
	Seretide 50/25	Evohaler pMDI	pMDI	120	163.5			2 puffs BD		≥ 4y

BDP = Beclometasone dipropionate; ICS = Inhaled corticosteroid; LABA = Long-acting beta-agonist; pMDI = Pressurised metered dose inhaler; BAI = Breath actuated (aerosol) inhaler; DPI = Dry powder inhaler

Environmental impact

pMDI contain hydrofluorocarbon (HFC) propellants that are powerful greenhouse gases that can contribute to global warming.

Dry powder inhalers or soft mist inhalers are generally preferred locally, unless there is a specific clinical or dexterity reason that an individual requires a pMDI or BAI.

In young children, a pMDI and a spacer is the preferred method of delivery; a face mask is required until the child can breathe reproducibly using the spacer mouthpiece. A pMDI plus spacer is also recommended for patient of any age for the treatment of mild and moderate acute asthma attacks.

Inhalers should be disposed of in pharmaceutical waste bins and not in general waste. Spacer cannot currently be recycled

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