

Acute Wheeze Guideline in Children

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➤ Criteria for use

This guideline was written by Dr Elinor Sefi, Dr Benita Morrissey, Colette Datt and Dr John Moreiras on behalf of the UCLP children's asthma network group. It was designed to be used by all hospitals in the network. It has been modified slightly to fit in with working practice within the Whittington Hospital

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In an emergency:

Click [here](#) to go straight to the [Acute Asthma flow-chart](#).

OR [CATS retrieval service](#) 0800 085 0003

(1) Introduction

Asthma affects 1.1million children in the UK. Many more pre-school children experience acute wheeze each year with viral infections. Acute wheeze is one of the commonest reasons for attendance to the emergency department and admission to hospital in children. Up to 75% of these admissions are thought to be avoidable. Evidence-based clinical pathways and guidelines have been shown to improve outcomes for children with acute wheeze and asthma, and reduce hospitalisation.

This integrated clinical guideline has been developed for children (between 2 and 16 years of age) with acute wheeze presenting to hospital. Recommendations are based on the best available evidence. Children under two years are more likely to have an alternative diagnosis and may respond inconsistently to bronchodilators and therefore are not included in this guideline.

The guideline has been developed for hospitals within UCL partners, to be used in emergency departments, paediatric ambulatory units and in-patient paediatric wards. It has been developed in collaboration with primary, secondary and tertiary care and the Children's Acute Transport Service. It includes an acute wheeze admission proforma and quick-reference flow charts for use in a busy emergency department as well as links to asthma plans and checklists for discharge.

To go straight to the [acute asthma management flow-chart click here.](#)

Acknowledgments and Contributions

We would like to thank all the members of the UCLP asthma network who have contributed to this guideline.

Related Whittington guidelines

- Paediatric allergy guideline
- Syncathen guideline

(2) Assessing the child with wheeze

2.1. History

Taking a full history is an important step in assessing children with acute wheeze but should not delay starting treatment particularly in severe and life-threatening episodes.¹

Always consider the following:

1. Is this really asthma? – See “Ensuring the correct diagnosis.”
2. If this is asthma, is it well controlled?
3. If it is not well controlled, what are the reasons for this?

This is an important opportunity to identify children with poor control, and to do something about it.³

Take a focused medical history including:

- The acute episode: symptoms, duration, triggers and prior drug treatment (including dosages, frequency of use, delivery method, time of last dose and response to treatment)
- Background asthma control: ask about interval symptoms, in particular symptoms with exercise, symptoms at night and need for rescue Salbutamol² – the [Asthma Control Test](#) is a useful tool for assessing background asthma control.
- Medication history (including dosages, delivery and frequency of use). More than one prescription per month of salbutamol and fewer than one prescription per month of inhaled steroids (if prescribed) may be a marker of poor control/adherence⁴
- Prior hospitalisations with acute wheeze (including previous life-threatening episodes and any admissions to HDU and ICU)
- Prior visits to GP/Emergency Department (ED) with acute asthma and number of courses of systemic steroids in last six months. Number of repeat prescriptions for inhalers.
- Co-existing medical conditions (particularly allergic rhinitis, hay fever, eczema and allergies)
- Take a detailed food allergy history (Which foods? Time to reaction? Describe reaction)
- Family and social history (including family history of atopy, smokers at home and pets)
- Number of school days missed due to asthma
- Use of complementary therapies: this may be associated with poor adherence to prescribed therapies
- Triggers; exercise, smoking, hay fever, animals, infections etc.
- Further information on Eczema can be found: <https://www.nice.org.uk/guidance/cg57>

2.2 Young people and adolescents⁵


- See young people and adolescents on their own for part of the consultation
- Ask if they smoke – if they do offer them advice to stop and [signpost](#) to local NHS smoking cessation services.
- If they do not smoke, encourage them to avoid tobacco smoke and urge them not to start smoking
- Ask about drugs and symptoms of anxiety and depression. These are significantly more prevalent amongst young people with asthma.⁶

2.3 Examination

Assess child on presentation using a structured approach (airway, breathing, circulation and disability) and record vital signs (pulse rate, respiratory rate and oxygen saturations.)

Level of activity (or alertness) and work of breathing are important parameters in assessing the severity of the wheeze episode, along with initial oxygen saturations in air. Wheezing is not a good marker of severity, as with increasing obstruction it may become bi-phasic or less apparent.

Often the priority is to do a respiratory examination, assess severity (next section) and start treatment. Then proceed to perform a full physical examination, including checking peak flow (if child is over five years and familiar with performing peak flow.) Plot height and weight on a growth chart.

	<p>Red Flags: A silent chest, drowsiness, agitation or confusion are signs of a life-threatening episode. Call for senior help and anaesthetic support immediately</p>
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2.4 Investigations

- **Peak flow** measurement can be helpful in assessing severity and response to treatment in children over five years who are familiar with the technique.

The best of three Peak Expiratory Flow (PEF) measurements ideally expressed, as a percentage of personal best can be useful. (See Appendix: PEF chart)

Peak flows should not be used for children with life-threatening asthma. Clinical assessment of severity may be more reliable especially in children under 10 years and those unfamiliar with these devices or who have poor technique.⁷

- **Chest X-rays** – chest X-rays rarely provide additional information and are not routinely indicated.⁸ A chest X-ray should be performed if there is subcutaneous emphysema, persisting unilateral signs suggesting pneumothorax, lobar collapse, a foreign body, or consolidation, an atypical history in a child with a first presentation of wheeze or life-threatening asthma not responding to treatment.
- **Blood gas analysis** should be avoided if possible as it may cause distress and further respiratory compromise. The child's clinical state is a better guide to treatment. Capillary sampling can be considered if there are life-threatening features not responsive to treatment, or uncertainty about the clinical diagnosis. A normal or raised pCO₂ indicates worsening asthma.

(3) Assessing severity

It is important to assess the severity of the wheeze episode on presentation and classify into **mild, moderate, severe or life threatening**.⁵ This will allow ensure that the correct treatment is given.

If any feature is present (severe and life threatening), this will automatically put the patient in this group.

Clinical Features	Mild	Moderate	Severe	Life-threatening
Alertness	Alert	Alert	Agitated/distressed	Confused/drowsy
Activity Level	Normal	Normal	Reduced	Exhaustion
Speech	Normal	Able to talk in short sentences	Too breathless to talk/feed	None
Oxygen Saturations	>94% in air	≥ 92% air	<92% air	<92% on oxygen Cyanosis
Heart Rate	<5yrs <140 ≥5yrs <125	<5yrs < 140 ≥5yrs < 125	<5yrs> 140 ≥5yrs>125	Bradycardia or hypotension
Respiratory Rate	<5yrs <40 ≥5yrs <30	<5yrs <40 ≥5yrs <30	<5yrs >40 ≥5yrs >30	
Work of Breathing	Minimal recession	Some increase. Mild to moderate recession and accessory muscle use	Markedly increased. Moderate to severe recession, marked accessory muscle use	Severe recession/poor respiratory effort or silent chest
Peak Flow		>50-75% best or predicted	33-50% best or predicted	Not appropriate

(4) Ensuring the correct diagnosis

Asthma causes recurrent respiratory symptoms of wheezing, cough, difficulty breathing, and chest tightness in children due to variable airway obstruction.

Asthma is a clinical diagnosis in children.⁵ It is made **more likely** if these symptoms are frequent and recurrent, worse at night and in the early morning, worse after exercise or with other triggers (such as exposure to pets, cold or damp air or with emotions,) and occur apart from colds.

Asthma is also **more likely** if children have other atopic conditions (such as eczema, allergic rhinitis or allergies,) or a family history of atopy or asthma.

The following are found less often in children with asthma, and may be clues to alternative diagnoses in wheezy children:⁵

Clinical Clue	Alternative diagnoses to consider
Symptoms present from birth or neonatal period	Congenital lung abnormality, cystic fibrosis, chronic lung disease of prematurity, ciliary dyskinesia
Family history of respiratory disease	Cystic fibrosis, immunodeficiency, neuromuscular disorder.
Severe upper respiratory tract disease	Ciliary dyskinesia, immunodeficiency
Excessive vomiting	Gastro-oesophageal reflux disease
Breathlessness with light-headedness and peripheral tingling	Hyperventilation/panic attacks
Persistent moist cough	Cystic fibrosis, bronchiectasis, recurrent aspiration, ciliary dyskinesia, immunodeficiency
Inspiratory Stridor	Tracheal or laryngeal disorder
Abnormal voice or cry	Laryngeal problem
Focal signs in chest	Inhaled foreign body, congenital abnormality, bronchiectasis, pneumonia
Finger clubbing	Cystic fibrosis, bronchiectasis.
Failure to thrive	Cystic fibrosis, immunodeficiency, gastro-oesophageal reflux
Focal or persistent CXR changes	Congenital abnormality, cystic fibrosis, recurrent aspiration, bronchiectasis, tuberculosis
Tachypnoea without wheeze	Severe acidosis e.g. DKA, renal failure
New onset of wheeze in older child +/- orthopnoea	Mediastinal mass

(5) Wheeze In the pre-school child

Acute wheeze, with viral upper respiratory tract infections, is very common in pre-school children. **The vast majority of these children do not have asthma** – and most will have stopped having episodes of wheeze by the age of six.

Pre-school wheeze has a different natural history and pathophysiology to childhood asthma, and children with pre-school wheeze often respond differently to asthma treatment (particularly corticosteroids.)

It is helpful to classify children with pre-school wheeze into two phenotypes:⁹

1. **Episodic Viral Wheeze** – Child only wheezes with viral upper respiratory tract infections and is symptom-free in between episodes.
2. **Multi-trigger Wheeze** – Child wheezes with upper respiratory tract infections but also with other triggers such as exercise, smoke and allergen exposure.

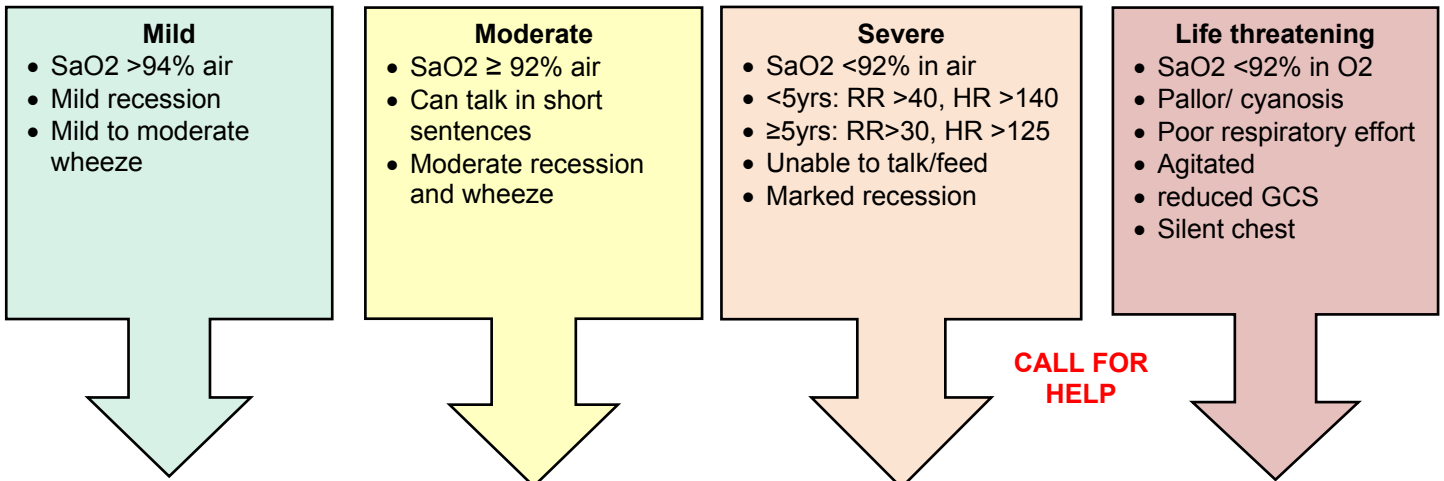
Prednisolone should not be given to pre-school children with wheeze who are well enough to be managed in the community. In children admitted to hospital it should not be used routinely in children with episodic viral wheeze.⁹

Prednisolone should be considered in children with multi-trigger wheeze and children with episodic wheeze with severe or life-threatening exacerbations, particularly those who require high dependency or intensive care.

For further information – see the review article: [Managing wheeze in pre-school children.](#)

(6) Acute Wheeze Flow Chart for Children 2-16 years

Start by assessing severity and treat according to most severe features



CALL FOR HELP

Give Oxygen if needed to keep saturations >93%.

High flow oxygen

Salbutamol via spacer

Reassess after 20 minutes **and repeat if needed up to 3 doses**

Consider oral prednisolone if:

Needs >1 dose salbutamol and/or:

- Known asthmatic
- ≥5 years old
- < 5 years with multi-trigger wheeze

Salbutamol via spacer

Oral prednisolone if:

- Known asthmatic
- ≥5 years old
- Consider if <5 years and multi-trigger wheeze

If poor response to first salbutamol add ipratropium to remaining salbutamol Burst.

Complete burst therapy of salbutamol and ipratropium every 20mins for 1st hour

Burst therapy of Salbutamol and ipratropium via spacer

(nebuliser if not tolerating spacer or sats <92%) every 20minutes

Oral prednisolone, (or IV hydrocortisone if vomiting)

REASSESS and if poor response:

- Repeat burst:
- IV magnesium bolus
- IV salbutamol bolus+/- infusion

Back to back nebulised salbutamol and ipratropium

- Obtain IV access
- U&E and blood gas
- IV hydrocortisone
- IV magnesium bolus

REASSESS and if poor response:

- Continue nebulisers
- Give IV salbutamol bolus and then infusion or if salbutamol toxicity, give IV aminophylline
- Call consultant +/- anaesthetist and CATS

Assess response to treatment after 1 hour and 2 hours and re-categorise

MILD

Safe to discharge if stable and only requiring Salbutamol every 3-4 hours

Complete 3 days of prednisolone if started.

Discharge with asthma plan.

Advise review within 48 hours by GP

MODERATE

Keep O₂ SaO₂ >93% Continue salbutamol every 1-3 hrs as needed

Safe to discharge when only requiring salbutamol every 3-4 hours

Complete 3 days of prednisolone if started.

Give asthma plan.

Advise review within 48 hours by GP

SEVERE

Keep O₂ SaO₂ >93% Continue **salbutamol every 30-60 minutes**

Continue **ipratropium every 20 minutes for first 2 hours** and then every 4 hours

Reassess frequently If no improvement and not already done so give:

- IV magnesium
- IV salbutamol bolus +/- infusion

LIFE THREATENING

Continue nebulisers Give **IV salbutamol +/- aminophylline** if not already done so.

Consider 2nd dose IV magnesium + antibiotics

Call anaesthetist and CATS Do CXR and gas If deteriorating consider intubation and ventilation

(7) Medication doses for acute asthma

Medication	Route of administration	Dose < 5 years	Dose ≥ 5 years	Comments
Salbutamol	MDI and spacer	5-10 puffs	10 puffs	1 puff = 100mcg
	Nebuliser	2.5mg	5mg	
Ipratropium Bromide (Atrovent)	MDI and spacer	20 mcg (1 puff) x 3	20 mcg (1 puff) x 6	20-40 mcg every 20 min for first 2 hrs
	Nebuliser	<2 years 125mcg 2-12 yrs 250mcg	2-12 years 250 mcg > 12 years 500 mcg	
Prednisolone	Oral	20mg	40mg	Consider carefully if <5 years (see guideline)
Hydrocortisone	Intravenous	4mg/kg every 6 hours (max 100mg) Or if weight unavailable use: < 2 years 25mg 2-5 years 50mg > 5 years 100mg		Give if vomiting or life-threatening episode of wheeze
Magnesium Sulphate	Intravenous Bolus	40mg/kg (max 2g) <i>If overweight use "ideal weight" based on their height centile or chart in back of cBNF</i>		Give over 20 min BP+Cardiac monitor* Can repeat within 1-2 hrs (further doses need Mg Levels)
Salbutamol <i>Please use the Salbutamol sticker (kept in HDU on Ifor & ED)</i>	Intravenous bolus	< 2 years 5mcg/kg ≥ 2 years 15mcg/kg (max 250mcg) <i>If overweight use "ideal weight" based on their height centile or chart in back of cBNF</i>		Single bolus Give over 3-5 minutes Cardiac monitor*
	Intravenous Infusion	1-2 mcg/kg/min (If weight over 40kg, calculate rate on 40kg) <i>If overweight use "ideal weight" based on their height centile or chart in back of cBNF</i>		Monitor side effects including lactate and K+. Cardiac monitor*
Aminophylline <i>Please use the Aminophylline sticker (kept in HDU on Ifor & ED)</i>	Intravenous loading dose	5mg/kg (max 500mg) <i>If overweight use "ideal weight" based on their height centile or chart in back of cBNF</i>		Loading not needed if on oral aminophylline. Give over 20-30 mins Cardiac monitor* Give antiemetics
	Intravenous infusion	< 12 years 1mg/kg/hr > 12 years 0.5-0.7 mg/kg/hr <i>If overweight use "ideal weight" based on their height centile or chart in back of cBNF</i>		Cardiac monitor* Give antiemetics Levels 4-6 hrs

- Bronchodilator therapy through MDI (Metered Dose Inhaler) with spacer should be first line as it is associated with fewer side effects.

(8) The evidence for acute asthma management

8.1 Oxygen

Oxygen should be given to all children with oxygen saturation levels < 94%.

In life-threatening asthma give oxygen via a non-rebreather mask (15 litres/minute.) In severe asthma, oxygen can be given by nasal cannula or a facemask. Aim to keep oxygen saturations at 94-98%. Care should be taken not to over administer oxygen as this may mask signs of deterioration in moderate and severe asthma. Remember Oxygen should be prescribed.

8.2 Salbutamol

Salbutamol should be given to all children presenting acutely with wheeze within 10 minutes of their arrival.¹⁰

Salbutamol is a short acting beta-2agonist, which should be used as first line bronchodilator therapy in childhood wheeze. It can be given by metered dose inhalers (by spacer) or by nebuliser. Both routes are equally efficacious as long as the doses used are sufficient (see medication doses.) In children giving Salbutamol via a spacer (as opposed to a nebulizer) results in less tachycardia and tremor and a reduced time in the emergency department, particularly for children with mild-moderate exacerbations.¹¹

An oxygen requirement is not necessarily a contraindication to the use of spacers; Spacers have been shown to be safe and well tolerated even in severe asthma.¹² A spacer with a facemask should be used for children under 5 years, and a spacer with a mouthpiece for children over 5 years. In children with moderate, severe and life-threatening wheeze give three doses of Salbutamol over the first hour in the ED.

Intravenous Salbutamol. There is limited evidence to support this from two small studies. Children who received IV Salbutamol had shorter recovery times and more rapid clinical improvement than those who received standard therapy.¹³⁻¹⁵ Currently the British Thoracic Society guidelines recommend consideration of a single bolus dose of intravenous Salbutamol in severe cases where the child has not responded to initial inhaled therapy.



Side effects of salbutamol can include tachycardia, tremor, hypokalaemia, headache, lactic acidosis, arrhythmias and palpitations and very rarely urticaria and paroxysmal bronchospasm. If the heart rate is >200 consider stopping salbutamol. If lactic acidosis is worsening or signs salbutamol toxicity, while on

IV salbutamol the rate may need to be reduced or stopped altogether. Discuss with consultant on call regarding other supportive medication (i.e. Magnesium Sulphate, Aminophylline etc.)

8.3 Prednisolone

Prednisolone should be given as soon as possible after arrival in the ED, and always within the first hour.

Early administration of Prednisolone to children with acute asthma reduces hospital admission and results in reduced beta-2agonist use and earlier recovery.¹⁶The earlier Prednisolone is given, the less likely a child is to need admission to hospital.^{17,18}

In children with severe asthma, no significant difference has been found between oral and intravenous steroids.¹⁹ Intravenous corticosteroids (IV hydrocortisone) should be reserved for children with life-threatening asthma or where there is vomiting or concern regarding the absorption of oral corticosteroids.

Make up prednisolone in a concentrated solution, as its taste can be unpleasant. Please prescribe prednisolone tablets. The tablets can be crushed and mixed with water readily. The soluble tablets are reserved for children <2yrs, or who do not tolerate the crushed tablets

Children should be given a three-day course of steroids unless they remain hospitalised at three days in which case a five-day course can be considered.²⁰

Prednisolone should not be used routinely in children with episodic viral wheeze – see [Wheeze in pre-school children](#).



There is no need to wean steroids if the course is <2 weeks.
Children on long-term oral steroids should carry a steroid card.
Consider the possibility of **adrenal insufficiency** in sick children on regular high dose inhaled steroids.

8.4 Ipratropium Bromide

Give Ipratropium Bromide with each dose of Salbutamol to all children with severe asthma for the first hour.

In moderate asthma, give after the first dose of Salbutamol if there is a poor response. Anticholinergics have a slower onset of action and weaker bronchodilating effect than short acting beta2-agonists but may specifically relieve cholinergic bronchial tone and reduce mucosal oedema. The addition of anticholinergics (usually 2-3 doses) to Salbutamol significantly reduced the risk of hospital admission. Children also showed a greater improvement in lung function, and experience less nausea and tremor.²¹



Side effects may include nausea, diarrhoea, constipation, headache and dizziness.

8.5 Magnesium Sulphate

Give IV magnesium sulphate to children with severe asthma who have responded poorly to initial burst therapy, or have on-going signs of a severe exacerbation at 1 hour.

In children with life-threatening asthma IV magnesium sulphate should be given alongside burst therapy.

The use of intravenous magnesium sulphate, in addition to Salbutamol and systemic steroids, is associated with a significant improvement in respiratory function and reduction in

hospital admission in children with moderate to severe asthma. Nebulised magnesium sulphate only appears to have beneficial effects in adults.^{22 23}

Intravenous infusion of magnesium sulphate during the first hour of hospitalization in patients with acute severe asthma significantly reduced the percentage of children who required mechanical ventilation support.²⁴

Magnesium Sulphate can be repeated within in 1-2 hours. Serum magnesium level measurement is indicated if further doses are being considered. There is insufficient evidence comparing IV magnesium sulphate versus IV Salbutamol for acute severe asthma in children.



Side effects: Intravenous magnesium sulphate has been well tolerated in studies, but can cause hypotension so monitor blood pressure throughout. Flushing, pain at infusion site, a dry mouth, and facial warmth have also been described.²⁵

8.6 Aminophylline

Aminophylline is not recommended as first-line therapy for children with severe acute asthma, but should be considered as an additional therapy in children who have not sufficiently responded to IV Salbutamol or Magnesium, or who have developed toxicities with these.

It may be useful early in treatment in children who present with severe or life threatening asthma who have received multiple doses of salbutamol prior to presentation and are showing toxicity or poor response to salbutamol.

The use of intravenous aminophylline has not been shown to result in additional bronchodilation or a significant reduction in the risk of hospital admission in patients with acute asthma in the ED, compared to standard care.²⁶ In children with a severe asthma exacerbation, the addition of IV aminophylline to beta2-agonists and glucocorticoids improved lung function within 6 hours of treatment. However it had no benefit on symptoms, number of nebulised treatments or length of stay. There is insufficient evidence to assess the impact on oxygenation, PICU admission and mechanical ventilation.



Side Effects include nausea, vomiting, diarrhoea, tachycardia, headaches and arrhythmias. Aminophylline is associated with a threefold risk of vomiting²⁷, so give with antiemetic cover.

8.7 Other Therapies

Montelukast – The use of oral montelukast is not currently recommended in moderate to severe asthma exacerbations of asthma.²⁸ A single dose of oral montelukast added to standard therapy of inhaled bronchodilators and systemic glucocorticoids, did not provide additional clinical benefit in children (aged over 5) with acute moderate to severe asthma.²⁹

Inhaled Steroids – There is insufficient evidence that inhaled corticosteroid therapy results in clinically important changes in respiratory function or clinical scores when used in acute asthma in addition to systemic corticosteroids.³⁰ In children treated in the ED for acute asthma a single 2-mg dose of budesonide added to standard therapy did not improve asthma severity scores or other short-term ED-based outcomes.³¹

(9) The Deteriorating child with wheeze

Most children with acute severe and life-threatening asthma will respond to initial medical therapy. In the very few children that do not respond and have a progressive respiratory deterioration, intubation and ventilation can be lifesaving. Complications are common post-intubation, the most common being hypotension requiring fluid resuscitation.

Evidence has shown that maximal medical therapy had only been administered in 31% (9/29) of children who required intubation for progressive respiratory deterioration.³² Always ensure that a child has received maximal medical therapy and consider alternative diagnoses. Early discussion with the paediatric and anaesthetic consultant on call and CATS (Children Acute Transport Service) is essential.

Indications for Intubation

Consider intubation in any child with the following:

- Tired
- Reducing conscious level
- Worsening hypoxaemia

* Blood gas analysis on its own is not a substitute for clinical assessment. Need for intubation should not be made solely on a Blood Gas.

The CATS website has an Asthma Guideline with specific instructions regarding intubation.

To go to the CATS asthma guideline click [here](#)

To make a referral to CATS call 0800 085 0003

(10) Weaning asthma Inhalers

Bronchodilators should be weaned according to the child's clinical state.

While the child is an inpatient a minimum of hourly assessment while the child is requiring 1-2 hourly salbutamol, and two-three hourly assessment when requiring salbutamol 3-4 hourly should be undertaken. This should include assessment of saturations and work of breathing to determine when the next dose of bronchodilator should be given.

Wheeze is not a good marker of asthma severity but the return of wheeze may be one indicator for the requirement of further bronchodilators. If appropriately trained staff are available, nurse led weaning and discharge may allow better patient focused weaning and discharge.

A suggested salbutamol-weaning plan on discharge is as follows:

Day 1: Give 6 puffs of salbutamol via spacer every 4 hours

Day 2: Give 4 puffs of salbutamol via spacer every 6 hours

Day 3: Give 2 puffs as required using usual inhaler device

This is a guide for families and weaning at home should also be guided by the child's condition and parents should be taught how to assess signs of respiratory distress in their children.

(11) Discharge Planning

Discharge planning should begin at admission using every opportunity for education of the child and family throughout the admission.

Children are usually ready for discharge when they require salbutamol no more frequently than every 4 hours, have no oxygen requirement, are drinking sufficiently and the child, family and medical staff feel comfortable with the child going home.

One of the aims at discharge should be to try to minimise the risk of future preventable admissions through the use of a comprehensive education package.³

Asthma education is the responsibility of all health professionals. All children should have their inhaler technique checked prior to discharge and should be discharged with written asthma information and a personalized asthma action plan (see asthma education below).

An assessment of long-term asthma control should be made and preventer therapy considered (see asthma control below).

Families should be advised to see the GP within 48 hours of discharge. The purpose of this visit is to ensure that the acute symptoms are resolving but also to review long term asthma control, to consolidate asthma education, to discuss the asthma action plan and to plan on-going follow up.

Nurse led salbutamol weaning and criteria led discharge may speed up the discharge process and prevent unnecessary delays but requires junior medical staff or senior nursing staff to have the necessary knowledge of asthma management and appropriate clinical skills in the assessment of asthma severity.

1. Inhaler technique checked
2. Asthma education discussed with child and family
3. Written asthma action plan/Information leaflet given
4. Background asthma control assessed
 - o Are they at risk of future admission or Server/life threatening asthma attack?
 - o Do they need a change to their preventer medication?
 - o Have you identified and given advice about triggers (including food allergy)?
5. Have you discussed smoking with the parent and/or child?
 - o Ask if they smoke
 - o Advice about the risk of smoking and passive smoking
 - o Act - Offer Nicotine replacement therapy, refer to quit smoking team (on ICE)
6. Discharge summary written and copy given to parents
 - o (Needed for 48hr review)
7. Parents advised to see GP within 48hrs of discharge
8. Do they need secondary care follow up
 - o All children admitted to the ward will need an outpatient review in 4-8 weeks
 - o If known to the asthma or Allergy team, please email us the discharge summary
 - o Are there social concerns?
 - o **WhittPaedAsthma@nhs.net**

(12) Asthma Education

Asthma education during an acute asthma exacerbation has been shown to be effective in reducing exacerbations, oral steroid use, visits to the emergency department and future hospitalisations.³³ Children using written symptom-based asthma plans also have been found to have a lower risk of exacerbations requiring an acute care visit.³⁴

The following is a guide as to what could be covered by the nurse or doctor discharging the patient with the parents. For adolescents offer part of the consultation without the parents.

What is Asthma?

- Inflammatory condition causing airway changes: tightening of smooth muscle, inflammation and mucous production
- Discuss how to identify and monitor for signs and symptoms of asthma:
 - Cough, breathlessness, wheeze, chest tightness
- Discuss differences between mild, moderate and severe exacerbations
- Discuss common triggers in childhood asthma
 - Viral respiratory infections, exposure to allergens such as house dust mite, cigarette smoke, exercise, cold or damp air. Symptoms often worse at night/early morning

The role of medications

- Reliever inhaler: Acute management
- Preventer inhaler: Interval management
- Using asthma plan, discuss frequency and dose for acute and interval management
- Reinforce need for long term adherence to preventer therapy

The use of inhalers

- Inhaler and spacer education essential
- Demonstrate and check inhaler technique
- Discuss cleaning and care of inhalers and spacers

Discharge Planning

- Discuss use of reducing medication plan
- Discuss use of asthma action plan for home asthma management: acute and interval management
- Discuss annual flu vaccination
- Discuss smoking cessation if appropriate
- Advise follow up with GP in 48 hours
- Inform if paediatric or respiratory follow up is required
- Give copy of asthma fact sheet to take home

Follow up

When to consider follow up in secondary care:

- More than 2 courses of prednisolone in a year
- Step 3 of BTS guideline
- Coexisting food allergies,
- Social concerns
- HDU admission
- Recurrent presentation to ED or Admissions
- Uncertainty about the diagnosis

(13) Asthma control

An assessment of asthma control is an essential part of the discharge process. It is important to remember that asthma control is not always directly linked to BTS medication step; for example a patient can be on step 4 and be well controlled with no interval symptoms, little no use of your reliever and no exacerbations. Conversely a patient could be on step 2 and have poor asthma control, frequent night time symptoms, daily use of reliever, multiple ED presentations etc.

In the [national review of asthma deaths](#), 10% of those who died had been discharged from hospital within the month prior to death. Of those patients for whom severity could be estimated, nearly 60% were being treated for mild asthma or moderate asthma. It is likely that many of these patients had poorly controlled, under-treated asthma, rather than truly mild or moderate disease

Asking children and families the following three questions has been shown to have good sensitivity for ascertaining poor asthma control in an Emergency Department in comparison with longer screening tools.²

1. **Symptoms at night**
2. **Symptoms with exercise**
3. **Need for rescue Salbutamol**

If children are using >1 salbutamol inhaler a month this is likely to reflect poor control.

The [asthma control test](#) is a validated scale which may be useful in the clinic setting.

Before considering alteration of drug therapy the following should be considered:

1. Is the diagnosis correct?
2. Are there any modifiable triggers?
3. Does the child have allergic rhinitis- treating this may help asthma control
4. Is there good adherence with existing therapy and if not, why? i.e. use of <1 steroid inhaler per month may indicate poor adherence.
5. Is there good inhaler technique?

The aim of asthma treatment is to control symptoms so children experience:⁵

- No daytime symptoms
- No night-time awakening due to asthma
- No need for rescue medication
- No limitations on activity including exercise
- No exacerbations

It is suggested that patients should see their GP/ practice nurse

1. Within 48 hours of discharge: to assess recovery and to reiterate knowledge.
2. After a month of starting preventer therapy or changing dose: to assess efficacy
3. After 3 months if asthma has been well controlled: to see if medication can be reduced
4. For a yearly asthma review

(14) Preventer therapy

14.1 Preventer therapy for children > 5 years:⁵

Severity of Asthma	Treatment
Step 1 – Mild Intermittent Asthma	Inhaled short-acting B ₂ agonist as required
Step 2 – Regular preventer therapy	Add inhaled steroid* at 200-400micrograms/day – start at dose appropriate to severity of the disease
Step 3 – Add-on therapy	Add inhaled long-acting B ₂ agonist (LABA) Assess response – if no response or control still inadequate consider increasing dose of inhaled steroids to 400micrograms/day.*
Step 4 – Persistent poor control	Increase inhaled steroid* up to 800micgrograms/day.
Step 5 – Frequent use of oral steroids	Refer to respiratory paediatrician

Remember children should start treatment at the step most appropriate to the initial severity of their asthma. For further details see [BTS guidelines](#) and the [paediatric BNF](#).

*=Beclomethasone Dipropionate

14.2 Preventer therapy for children < 5 years:⁹

Episodic viral wheeze – Consider the use of interval or continuous montelukast (a Leukotriene Receptor Antagonist) – this has been shown to reduce unscheduled health-care consultations and time off child-care, or off work for parents. Start treatment at the first sign of a viral cold and discontinue it when the child is clearly better.

Multi-trigger wheeze – Give a trial of either inhaled corticosteroids or montelukast for 4-8 weeks. After this period stop treatment. Only resume treatment if symptoms recur and then reduce treatment to the lowest level that controls treatment. If there is no benefit consider using whichever treatment not already tried. If this does not help refer for consideration of further investigations.

(15) Other helpful resources

British Thoracic Society Clinical Guidelines - <http://www.brit-thoracic.org.uk/document-library/clinical-information/asthma/btssign-guideline-on-the-management-of-asthma/>

BNF for children - http://www.bnf.org/bnf/org_450055.htm

CATS website and guideline on acute asthma - <http://site.cats.nhs.uk>
http://site.cats.nhs.uk/wp-content/uploads/2013/12/cats_asthma_2013.pdf

Asthma UK - <http://www.asthma.org.uk>

Spotting the Sick Child - <https://www.spottingthesickchild.com>

Itchy, Sneezzy, Wheezy - <http://www.itchysneezzywheezy.co.uk>

BMJ review article on wheeze in pre-school children -
<http://www.bmj.com/content/348/bmj.g15>

NHS smoking cessation – www.quitnow.smokefree.nhs.uk

Paediatric Wheeze Pathway: For children 2-16 years

Doctor	
Date	
Time Seen	

This proforma is designed for use in A&E for children aged 2 years or older presenting with wheeze. It should be used in conjunction with the acute wheeze guideline, which can be found on the intranet.

Initial Assessment:

Heart Rate	
Respiratory Rate	
SaO2	
Temp	
PEFR (>6yrs)	
Increased work of breathing	None Mild Moderate Severe
Able to speak in sentences	Yes No

Refer to treatment flowchart and categorise:

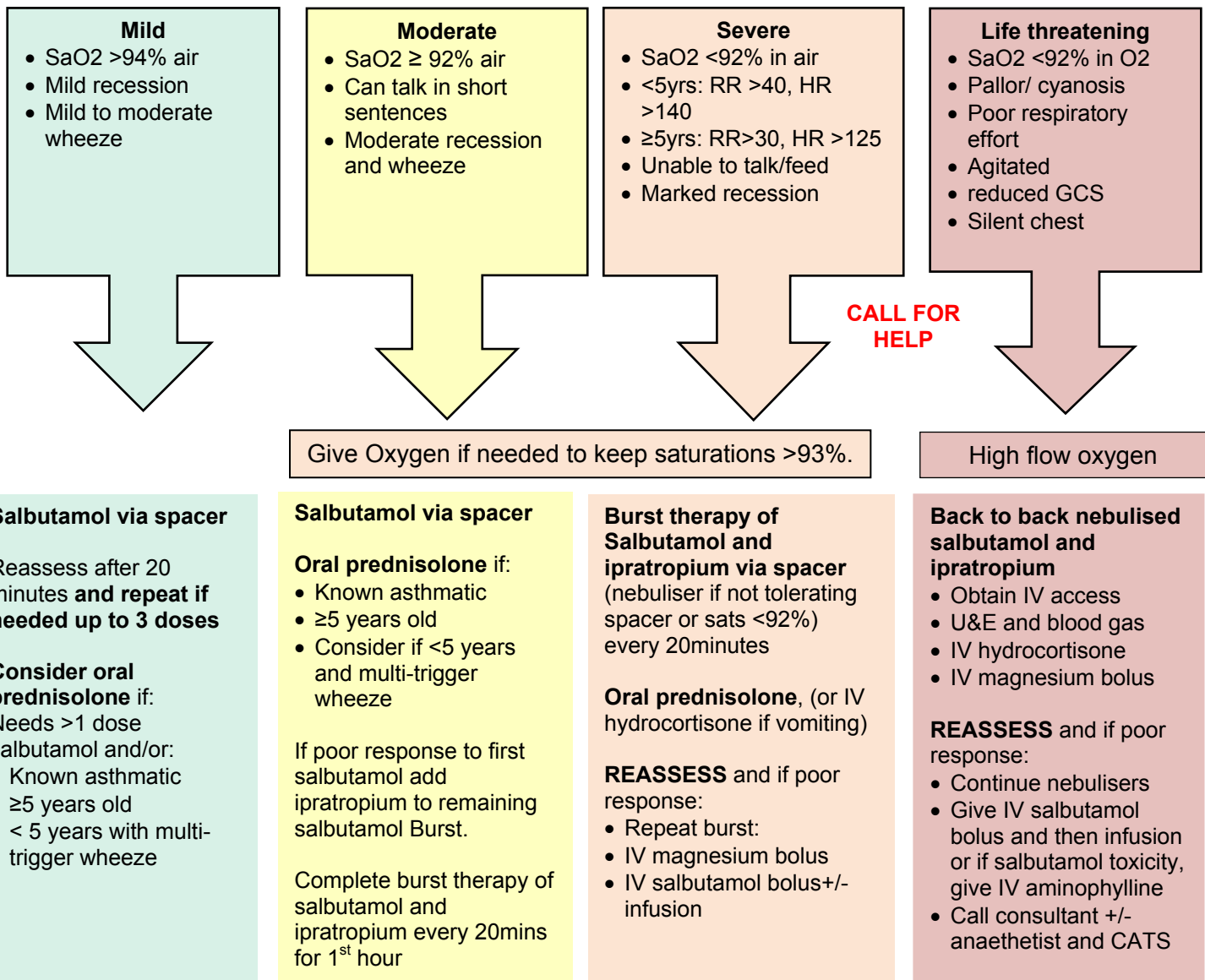
Mild Moderate Severe Life-threatening

If severe or life threatening bleep paediatric registrar

Date	Time	Drug	Dose	Route	Doctors Signature	Time given	Nurses Signature
		Prednisolone (see flowchart if <5yrs)		Oral			
		Salbutamol					
		Ipratropium Bromide					
		Salbutamol					
		Ipratropium Bromide					
		Salbutamol					
		Ipratropium Bromide					

Acute Wheeze Flow-Chart: For children 2-16 years

Start by assessing severity and treat according to most severe features



Assess response to treatment after 1 hour and 2 hours and re-categorise

MILD	MODERATE	SEVERE	LIFE THREATENING
<p>Safe to discharge if stable and only requiring Salbutamol every 3-4 hours</p> <p>Complete 3 days of prednisolone if started.</p> <p>Discharge with asthma plan.</p> <p>Advise review within 48 hours by GP</p>	<p>Keep O₂ SaO₂ >93% Continue salbutamol every 1-3 hrs as needed</p> <p>Safe to discharge when only requiring salbutamol every 3-4 hours</p> <p>Complete 3 days of prednisolone if started.</p> <p>Give asthma plan.</p> <p>Advise review within 48 hours by GP</p>	<p>Keep O₂ SaO₂ >93% Continue salbutamol every 30-60 minutes</p> <p>Continue ipratropium every 20 minutes for first 2 hours and then every 4 hours</p> <p>Reassess frequently If no improvement and not already done so give:</p> <ul style="list-style-type: none"> • IV magnesium • IV salbutamol bolus +/- infusion 	<p>Continue nebulisers Give IV salbutamol +/- aminophylline if not already done so.</p> <p>Consider 2nd dose IV magnesium + antibiotics</p> <p>Call anaesthetist and CATS Do CXR and gas If deteriorating consider intubation and ventilation</p>

Medication Doses for Acute Asthma

Medication	Route of administration	Dose < 5 years	Dose ≥ 5 years	Comments
Salbutamol	MDI and spacer	5-10 puffs	10 puffs	1 puff = 100mcg
	Nebuliser	2.5mg	5mg	
Ipratropium Bromide (Atrovent)	MDI and spacer	20 mcg (1 puff) x 3	20 mcg (1 puff) x 6	20-40 mcg every 20 min for first 2 hrs
	Nebuliser	<2 years 125mcg 2-12 yrs 250mcg	2-12 years 250 mcg > 12 years 500 mcg	
Prednisolone	Oral	20mg	40mg	Consider carefully if <5 years (see guideline)
Hydrocortisone	Intravenous	4mg/kg every 6 hours (max 100mg) Or if weight unavailable use: < 2 years 25mg 2-5 years 50mg > 5 years 100mg		Give if vomiting or life-threatening episode of wheeze
Magnesium Sulphate	Intravenous Bolus	40mg/kg (max 2g) <i>If overweight use "ideal weight" based on their height centile or chart in back of cBNF</i>		Give over 20 min BP+Cardiac monitor* Can repeat within 1-2 hrs (further doses need Mg Levels)
Salbutamol <i>Please use the Salbutamol sticker (kept in HDU on Ifor & ED)</i>	Intravenous bolus	< 2 years 5mcg/kg ≥ 2 years 15mcg/kg (max 250mcg) <i>If overweight use "ideal weight" based on their height centile or chart in back of cBNF</i>		Single bolus Give over 3-5 minutes Cardiac monitor*
	Intravenous Infusion	1-2 mcg/kg/min (If weight over 40kg, calculate rate on 40kg) <i>If overweight use "ideal weight" based on their height centile or chart in back of cBNF</i>		Monitor side effects including lactate and K+. Cardiac monitor*
Aminophylline <i>Please use the Aminophylline sticker (kept in HDU on Ifor & ED)</i>	Intravenous loading dose	5mg/kg (max 500mg) <i>If overweight use "ideal weight" based on their height centile or chart in back of cBNF</i>		Loading not needed if on oral aminophylline. Give over 20-30 mins Cardiac monitor* Give antiemetics
	Intravenous infusion	< 12 years 1mg/kg/hr > 12 years 0.5-0.7 mg/kg/hr <i>If overweight use "ideal weight" based on their height centile or chart in back of cBNF</i>		Cardiac monitor* Give antiemetics Levels 4-6 hrs

- Bronchodilator therapy through MDI (Metered Dose Inhaler) with spacer should be first line as it is associated with fewer side effects.

History

Presenting History

Duration of this episode:

Number of doses of salbutamol prior to this presentation:

Triggers of this episode:

Other triggers:

Frequency use of salbutamol

Nocturnal cough: Yes No

Wheeze with exercise Yes No

Smoking in household Yes No

If child >11 does he or she smoke? Yes No

Past Medical History

Eczema Yes No

Hay fever Yes No

Allergic rhinitis Yes No

Food allergy Yes No

Anaphylaxis Yes No

Previous PICU w/ asthma Yes No

Number previous admissions asthma:

Social and Family History

Family history atopy: No Yes Details:

In adolescents: ask about symptoms of low mood or anxiety

Days of school missed:

Drug History

How often misses preventer therapy?

Uses spacer with inhalers? Yes No

Use of complementary therapies? Yes No Details:

Allergies:

Immunisations:

Name

Signature

Designation

Date/time

Examination

HR	
RR	
SaO2	
Increased work of breathing <i>(Please circle)</i>	<i>None Mild Moderate Severe</i> <i>Poor respiratory effort</i>
BP	
Temp	
PEFR <i>(only if >6yrs & knows how)</i>	
PEWS	Green Yellow Red

Impression

MILD

MODERATE

SEVERE

LIFE-THREATENING

Management Plan

Name	Signature	Designation	Date/time
------	-----------	-------------	-----------

Outcome (Please circle):	Home	Ambulatory Unit	Ward	Transfer
-----------------------------	------	-----------------	------	----------

Discharge Checklist

Please tick or cross as indicated:

- 9. Inhaler technique checked
- 10. Asthma education discussed with child and family
- 11. Written asthma action plan/Information leaflet given
- 12. Background asthma control assessed
 - o Are they at risk of future admission or Server/life threatening asthma attack?
 - o Do they need a change to their preventer medication?
 - o Have you identified and given advice about triggers (including food allergy)?
- 13. Have you discussed smoking with the parent and/or child?
 - o Ask if they smoke
 - o Advice about the risk of smoking and passive smoking
 - o Act - Offer Nicotine replacement therapy, refer to quit smoking team (on ICE)
- 14. Discharge summary written and copy given to parents
 - o (Needed for 48hr review)
- 15. Parents advised to see GP within 48hrs of discharge
- 16. Do they need secondary care follow up
 - o All children admitted to the ward will need an outpatient review in 4-8 weeks
 - o If known to the asthma or Allergy team, please email us the discharge summary
 - o Are there social concerns?
 - o **WhittPaedAsthma@nhs.net**

Name

Signature

Designation

Date/time

Observation chart

Name: _____

Date of birth: _____

MRN: _____

Date												Date
Time												Time
Temp												Temp
HR / BP	200											200
	190											190
	180											180
	170											170
	160											160
	150											150
	140											140
	130											130
	120											120
	110											110
	100											100
	90											90
	80											80
	70											70
	60											60
50											50	
40											40	
CCRT												CCRT
Resp*	80											80
	70											70
	60											60
	50											50
	40											40
	30											30
	20											20
	10											10
	RR											RR
	Conc. O2											Conc. O2
	SaO2											SaO2
	Work of breathing											Work of breathing
	Severe											Severe
	Moderate											Moderate
	Mild											Mild
Normal											Normal	
AVPU												AVPU
Size (mm)	R											R + = Reacts
Reaction	R											R - = No react
Size (mm)	L											L SI = Sluggish
Reaction	L											L
Capillary Blood Glucose												Capillary Blood Glucose
Pain Scores												Pain Scores
PEWS												PEWS
OBSRVS' INITIALS:												

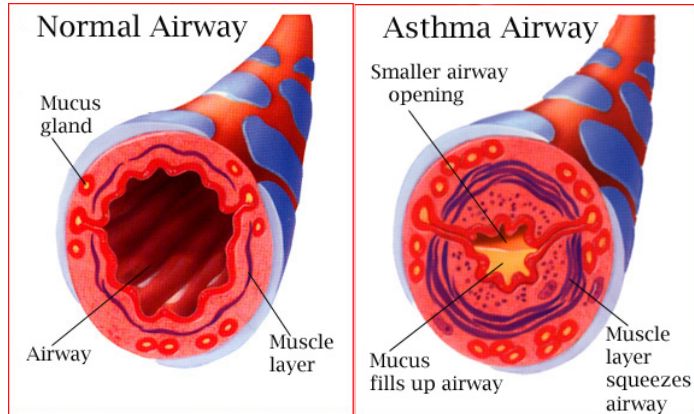


Pupil Scale (MM)

Viral induced wheeze and asthma fact sheet for parents

What is making my child wheeze?

Asthma and viral induced wheeze affect the lungs. The airways in the lungs become inflamed and swollen, making it difficult for your child to breathe.



Does my child have asthma or viral induced wheeze?

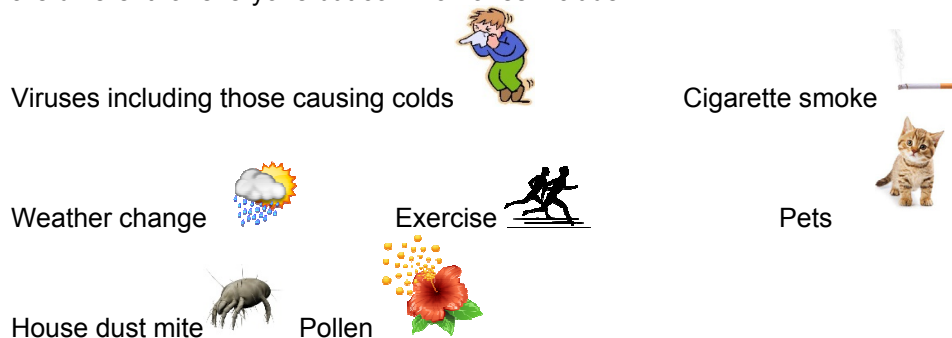
As many as one in three preschool children will have a wheezy episode, usually starting with a cough and runny nose caused by a virus. Only very few of these children will have asthma.

Viral induced wheeze: Children with viral induced wheeze **only** wheeze when they have a viral infection. The treatment is usually a reliever inhaler (usually blue) and sometimes if children have repeated episodes, a medicine taken by mouth which reduces swelling of the airways.

Asthma: Children with asthma cough and wheeze with viral infections but also with other triggers. The treatment for asthma is a reliever inhaler (usually blue) but also often a preventer inhaler, which should be taken every day to work properly. Asthma can be well controlled with the right medicine in nearly all children. You should see your doctor regularly if your child is on preventer medication.

Asthma triggers

Asthma triggers are things, which make the airways inflamed and swollen, and cause asthma. These are different for everyone but common ones include:



Smoking can make wheeze episodes more frequent and severe:
www.quitnow.smokefree.nhs.uk

Asthma treatment

Asthma is usually treated with inhalers, which deliver the medicine directly into the lungs where it is needed. Sometimes your doctor will prescribe a short course of oral steroids for an asthma attack.

Reliever Inhalers- usually blue

Relievers work by relaxing the muscles in the airways, which get tight during an attack. Reliever inhalers work **quickly** (within 5-10 minutes) and should last for at least 4 hours. Your child should use the reliever inhaler if: COUGHING/ WHEEZING or SHORT OF BREATH

Weaning salbutamol after a wheezy episode:

Day 1: Give 6 puffs every 4 hours

Day 2: Give 4 puffs every 6 hours

Day 3: Give 2 puffs as needed

Preventer Inhalers- usually brown/orange or purple

Preventers help to stop the airways becoming red and swollen. They do not work straight away and need to be taken EVERYDAY, even when your child is WELL.

Using your inhalers

ALWAYS use your inhaler with a spacer- it helps more medicine to get to the lungs where it is needed.



1. Remove the cap from the inhaler
2. Shake the inhaler well and put firmly into the end of the spacer
3. Place the mask over your child's face, covering the nose and mouth and making a good seal.
4. If your child is 5 or older they may prefer a spacer with a mouthpiece. Ask them to place the mouthpiece between their teeth and to close their lips around the entire mouthpiece so there are no gaps. Hold the spacer level so that it does not tip up or hang down.
5. Press the inhaler once to release a dose of medicine into the spacer- do not remove the inhaler
6. Allow your child to breathe in and out 4 or 5 times i.e. leave spacer in position for 15-20 seconds
7. If further doses are needed shake inhaler again and repeat steps 3-5.

How to care for your spacer

- The spacer should be cleaned once a week
- Take the spacer apart and wash it in warm water containing a little washing up liquid or mild soap
- DO NOT RINSE. Do not wipe the spacer dry – allow it to air dry. This can be done overnight.
- Put spacer back together.

If your child has been treated in A&E or admitted to the ward with a wheezy episode, it is important to make an appointment to see your GP within 48 hours of going home.

Further information and resources are available free from asthma UK:
www.asthma.org.uk



Asthma plan

Asthma UK Asthma plans – click this [link](#)

Monkey has Asthma Wheeze plan:

- Copies should be available in your working area (IFOR, Children's ambulatory unit and paediatric emergency department)
- An electronic copy can be downloaded from the intranet.
-

My Asthma/Wheeze Plan for Home, School, and Work

Name: _____ DOB: _____ Hospital No: _____ Plan No: _____ Date: _____

SYMPTOMS

1 I am well.
I have no cough/wheeze.
I can sleep normal activities.

2 I am coughing.
I am getting a cold.
I am coughing/wheezeing day and/or night.
My chest is/has been wet & raspy with/without a mack.

3 My coughing/wheezeing is getting worse, especially at night.
My chest is/has been wet and raspy with/without a mack.

4 I am very unwell.
My chest is/has been wet & raspy all day.
I am getting my funny or sick.
My breathing rate is more than 30 per minute.
I am too breathless to talk or eat.

ACTIONS

1 I need to take my normal medication of:
Preventer: _____
Reliever: _____
Take _____ puffs every morning and evening.
Take _____ puffs on needed and before exercise.
Other Therapy: _____

2 I need to take my normal medication of:
Preventer: _____
Reliever: _____
Take _____ puffs every morning and evening.
Take _____ puffs every 4 hours.
Other Therapy: _____

3 I need to take my medication as in step 2 and also see my GP urgently or come to the **EMERGENCY DEPARTMENT (ED)** using the community children's nurse or the hospital Asthma Nurse.
I also need to increase my reliever medication to:
• 10 puffs of SALBUTAMOL, four or more six hourly.
• Repeat 10 puffs of SALBUTAMOL, inhaled every 4 hours.

4 Call 999 or come to the **EMERGENCY DEPARTMENT (ED)** urgently.
I need to take my medication as in step 2 and also:
• 10 puffs of SALBUTAMOL, inhaled into the spacer every 4 hours.
• Repeat every 10 puffs of the SALBUTAMOL inhaled into the spacer every 4 hours until seeing medical assistance.

Weaning Plan:
Day 1: _____
Day 2: _____
Day 3: _____
Day 4: _____

Based on NICE Asthma 2010, developed by NHS England, 2010.

What is the difference between Asthma and VIBRAL-INDUCED WHEEZE?
VIBRAL-INDUCED WHEEZE (VW) - If you only wheeze with a virus or cold but are well in between.

Asthma - When you wheeze with triggers like dust, pollen, furry animals, and exercise as well as with a virus or cold.

What is the treatment?
Most children will only get one or two episodes of VW. Usually, the treatment will be with SALBUTAMOL (blue) inhaler and spacer given on your wheeze days.

Asthma treatment is usually with a preventer inhaler, which needs to be taken daily, and a reliever inhaler to be taken when you start to wheeze or get a chesty.

For some children, who get repeated episodes of VW, they may benefit from taking a course of PREDNISOLONE. This will be discussed by the doctor and you will be asked to see your GP if you are not sure.

By my asthma and wheeze?
The international gold standard is the Asthma Control Test (ACT), which can be found on the asthma UK website at www.asthma.org.uk

Where can I go for more information?
www.asthma.org.uk

Top 10 things affect your asthma:

- Cold
- Coughs and colds
- Dust
- Exercise
- Food
- Hay fever
- Infections
- Pets
- Pollution
- Stress

What to do next?
If you have attended the **EMERGENCY DEPARTMENT (ED)** following an episode of Asthma or VIBRAL-INDUCED WHEEZE, you should receive an appointment to see your General Practitioner (GP) within 2 working days for a review. (Detailed instructions for Health and Care Professionals (HCP) available on request)

What to do next?
If you have attended the **EMERGENCY DEPARTMENT (ED)** following an episode of Asthma or VIBRAL-INDUCED WHEEZE, you should receive an appointment to see your General Practitioner (GP) within 2 working days for a review. (Detailed instructions for Health and Care Professionals (HCP) available on request)

What is a preventer inhaler?
Preventer inhalers stop your asthma symptoms as they prevent your airways from getting inflamed.

What is a reliever inhaler?
Reliever inhalers help you breathe better when you have an asthma attack.

My asthma nurse:
Name: _____
Phone: _____

It's patients like that you puffin' fit into to help his medicine get to your lungs!

Your Asthma Plan is medical

Nice asthma quality indicators

The NICE quality standard for asthma sets out what high-quality care in the NHS should include so that the best possible care can be offered to children and young people with asthma using NHS services in England.

The following quality indicators relate to children and young people:

1. People with newly diagnosed asthma have a diagnosis made in line with BTS guidance.
2. Children and young people with asthma receive a written plan with details of how their asthma will be managed.
3. People with asthma are given training in using their inhaler before they start any new inhaler treatment.
4. Children and young people with asthma have a review of their asthma and its management at least once a year.
5. People with asthma who go to see a healthcare professional because their symptoms have worsened have their symptoms measured at the time of the appointment.
6. People with asthma who have symptoms have an assessment of how well their asthma is controlled.
7. Children aged 5 years or older who see a healthcare professional with severe life-threatening asthma are given oral or intravenous steroids within 1 hour.
8. People admitted to hospital with a sudden worsening of their asthma have a review by a member of a specialist team before discharge.
9. Children and young people who receive treatment in hospital or through out-of-hours services for a sudden worsening of their asthma see a health care professional in their own GP practice within 2 working days of treatment.
10. People with asthma that is difficult to control are offered an assessment by team that specialises in managing 'difficult asthma'.

PAEDIATRIC NORMAL VALUES

PEAK EXPIRATORY FLOW RATE

For use with EU / EN13826 scale PEF meters only

Height (m)	Height (ft)	Predicted EU PEFR (L/min)	Height (m)	Height (ft)	Predicted EU PEFR (L/min)
0.85	2'9"	87	1.30	4'3"	212
0.90	2'11"	95	1.35	4'5"	233
0.95	3'1"	104	1.40	4'7"	254
1.00	3'3"	115	1.45	4'9"	276
1.05	3'5"	127	1.50	4'11"	299
1.10	3'7"	141	1.55	5'1"	323
1.15	3'9"	157	1.60	5'3"	346
1.20	3'11"	174	1.65	5'5"	370
1.25	4'1"	192	1.70	5'7"	393

Normal PEF values in children correlate best with height; with increasing age, larger differences occur between the sexes. These predicted values are based on the formulae given in Lung Function by J.E. Cotes (Fourth Edition), adapted for EU scale Mini-Wright peak flow meters by Clement Clarke.

Date of preparation – 7th October 2004



Mini-Wright (Standard Range) EU scale
Blue text on a yellow background

Single Patient Use: Part Ref: 3103388
Multiple Patient Use: Part Ref: 3103387
NHS Logistics Code: FDD 609



Mini-Wright (Low Range) EU scale
Blue text on a yellow background

Single Patient use: Part Ref: 3104708
Multiple Patient Use: Part Ref: 3104710

For more information, visit the website www.peakflow.com



Precision by Tradition

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Tel. +44 (0) 1279 414969 Fax. +44 (0) 1279 456304 www.peakflow.com email: resp@clement-clarke.com

Drug Labels

BOLUS – IV SALBUTAMOL PRESCRIPTION (max Dose = 250 micrograms)

<2yrs: 5mcg/kg over 5 minutes

Patient's Weight:

Weight x 5 = _____ micrograms in 5mls of NaCl 0.9%. Run at 60ml/hr. Flush with 5ml of NaCl 0.9% at the same rate

≥2yrs: 15mcg/kg over 5 minutes (max 250 micrograms)

Weight x 15 = _____ micrograms in 5mls of NaCl 0.9%. Run at 60ml/hr. Flush with 5ml of NaCl 0.9% at the same rate

Date: _____

Prescriber's Signature: _____

MAINTENANCE IV SALBUTAMOL INFUSION PRESCRIPTION

for children < 20kg

Patient's Weight:

Salbutamol: Weight X1 _____ mg in 50mls of Glucose 5%

Infuse at the rate of:

3 ml/hr	=	1 microgram /kg/min
6 ml/hr	=	2 micrograms/kg/min
9 ml/hr	=	3 micrograms/kg/min
12 ml/hr	=	4 micrograms/kg/min
15ml/hr	=	5 micrograms/kg/min

Date: _____

Prescriber's Signature: _____

MAINTENANCE IV SALBUTAMOL INFUSION PRESCRIPTION

**for children between 20kg to 40kg
(if over 40kg calculate dose on 40kg weight)**

Patient's Weight:

Salbutamol: Weight X 2.5 _____ mg (max = 100mg) in 500mls of Glucose 5%

Infuse at the rate of:

12 ml/hr	=	1 microgram /kg/min
24 ml/hr	=	2 micrograms /kg/min
36 ml/hr	=	3 micrograms /kg/min
48 ml/hr	=	4 micrograms /kg/min
60 ml/hr	=	5 micrograms /kg/min

Date: _____

Prescriber's Signature: _____

IV AMINOPHYLLINE INFUSION PRESCRIPTION

Aminophylline: Weight x 10= _____ mg in Sodium Chloride 0.9% to a vol of 50ml

Patient's Weight: kg

For Loading Dose: Run at 50 ml/hr for 30 mins (5 mg/kg over 30 mins)
(max loading dose 500mg)

THEN infuse at rate of:

5 ml/hr	=	1 mg/kg/hr	age	1 mth - 9 yrs
3.8 ml/hr	=	0.8 mg/kg/hr	age	9 - 16 yrs
2.5 ml/hr	=	0.5 mg/kg/hr	age	16 - 18 yrs

Prescribers signature: _____

Date: _____

***Take blood level for aminophylline 4-6hrs after starting infusion and adjust rate accordingly**

****To avoid excessive dosage in obese children, calculate dose based on ideal weight for height**

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To be completed and attached to any procedural document when submitted to the appropriate committee for consideration and approval

		Yes/No	Comments
1.	Does the procedural document affect one group less or more favourably than another on the basis of:		
	• Race	No	
	• Ethnic origins (including gypsies and travellers)	No	
	• Nationality	No	
	• Gender	No	
	• Culture	No	
	• Religion or belief	No	
	• Sexual orientation including lesbian, gay and bisexual people	No	
	• Age	No	
	• Disability - learning disabilities, physical disability, sensory impairment and mental health problems	No	
2.	Is there any evidence that some groups are affected differently?	No	
3.	If you have identified potential discrimination, are any exceptions valid, legal and/or justifiable?	No	
4.	Is the impact of the procedural document likely to be negative?	No	
5.	If so can the impact be avoided?	N/A	
6.	What alternatives are there to achieving the procedural document without the impact?	N/A	
7.	Can we reduce the impact by taking different action?	N/A	

If you have identified a potential discriminatory impact of this procedural document, please refer it to the Director of Human Resources, together with any suggestions as to the action required to avoid/reduce this impact.

For advice in respect of answering the above questions, please contact the Director of Human Resources.

Checklist for the Review and Approval of Procedural Document

To be completed and attached to any procedural document when submitted to the relevant committee for consideration and approval.

	Title of document being reviewed:	Yes/No	Comments
1.	Title		
	Is the title clear and unambiguous?	Yes	
	Is it clear whether the document is a guideline, policy, protocol or standard?	Yes	
2.	Rationale		
	Are reasons for development of the document stated?	Yes	
3.	Development Process		
	Is it clear that the relevant people/groups have been involved in the development of the document?	Yes	
	Are people involved in the development?	Yes	
	Is there evidence of consultation with stakeholders and users?	Yes	
4.	Content		
	Is the objective of the document clear?	Yes	
	Is the target population clear and unambiguous?	Yes	
	Are the intended outcomes described?	Yes	
5.	Evidence Base		
	Are key references cited in full?	N/A	
	Are supporting documents referenced?	N/A	
6.	Approval		
	Does the document identify which committee/group will approve it?	Yes	
7.	Dissemination and Implementation		
	Is there an outline/plan to identify how this will be done?	Yes	
8.	Document Control		
	Does the document identify where it will be held?	Yes	
9.	Process to Monitor Compliance and Effectiveness		
	Are there measurable standards or KPIs to support the monitoring of compliance with and effectiveness of the document?	Yes	
	Is there a plan to review or audit compliance with the document?	Yes	
10.	Review Date		
	Is the review date identified?	Yes	
	Is the frequency of review identified? If so is it acceptable?	Yes	
11.	Overall Responsibility for the Document		
	Is it clear who will be responsible for co-ordinating the dissemination, implementation and review of the document?	Yes	

Executive Sponsor Approval

If you approve the document, please sign and date it and forward to the author. Procedural documents will not be forwarded for ratification without Executive Sponsor Approval

Name		Date	
Signature			

Relevant Committee Approval

The Director of Nursing and Patient Experience's signature below confirms that this procedural document was ratified by the appropriate Governance Committee.

Name		Date	
Signature			

Responsible Committee Approval – only applies to reviewed procedural documents with minor changes

The Committee Chair's signature below confirms that this procedural document was ratified by the responsible Committee

Name		Date	
Name of Committee		Name & role of Committee Chair	
Signature			

Tool to Develop Monitoring Arrangements for Policies and guidelines

What key element(s) need(s) monitoring as per local approved policy or guidance?	Who will lead on this aspect of monitoring? Name the lead and what is the role of the multidisciplinary team or others if any.	What tool will be used to monitor/check/observe/Assess/inspect/ authenticate that everything is working according to this key element from the approved policy?	How often is the need to monitor each element? How often is the need complete a report ? How often is the need to share the report?	What committee will the completed report go to?
Element to be monitored	Lead	Tool	Frequency	Reporting arrangements
All elements	UCLP children's asthma network group	Review of incidents/ audit if appropriate	As required	UCLP children's asthma network group review

