

Acute Management of Wheeze and Asthma - Paediatric Full Clinical Guideline - Joint Derby & Burton

Reference no.: CH CLIN G 07/ Aug 20/v006

1. Introduction

Acute severe wheezing in childhood remains a common cause for acute hospital referral. Asthma exacerbations can be life threatening. They must be recognised early and prompt appropriate treatment given.

In addition to this guideline complex asthma cases should be reviewed by a respiratory paediatrician as per the BTS guidance¹.

2. Features of non-severe wheeze/asthma

- Talking in full sentences
- Good air entry, mild to moderate wheeze
- Respiratory rate- normal range
 ≤40 breaths/min (2-5 year olds)
 ≤30 breaths/min (> 5 year olds)
- Heart rate- normal range
 ≤140/min (2-5 year olds)
 ≤125/min (> 5 year olds)
- SpO₂ ≥ 92% (in air)
- No use of accessory muscles
- PEFr (if possible) > 50% predicted
- Still feeding well
- No severe/life threatening features

3. Recognition of acute severe asthma

<p style="text-align: center;">1-5 years</p> <ul style="list-style-type: none"> • SaO₂ < 92% in air • Too breathless to talk/feed • Respiratory rate > 40/min • Heart Rate > 140/min • Significant respiratory distress 	<p style="text-align: center;">>5 years</p> <ul style="list-style-type: none"> • SaO₂ < 92% in air • PEFr 33- 50% of best • Respiratory rate > 30/min • Heart Rate > 125/min • Use of accessory muscles
---	--

4. Recognition of life threatening features

<p style="text-align: center;">2-5 years</p> <ul style="list-style-type: none"> • Cyanosis • Silent chest • Poor respiratory effort • Fatigue or exhaustion • Agitation or reduced level of consciousness 	<p style="text-align: center;">>5 years</p> <ul style="list-style-type: none"> • As for 2-5 years plus • Too breathless to talk • PEFr < 33% of best
---	--

5. Main body of Guidelines

Immediate assessment – pre treatment

- Assess and treat AIRWAY, BREATHING and CIRCULATION as appropriate
- Pay particular attention to:
 - **Airway** – presence of stridor suggests croup/upper airway component! Consider the possibility of foreign body aspiration
 - **Breathing** – Respiratory rate, recession, oxygen saturations and work of breathing/ accessory muscle use are important initial considerations. Check air entry is present and equal.
 - **Circulation** – pulse rate, can be affected by previous salbutamol treatment. A fall in life threatening asthma is a pre-terminal sign.
 - **Disability** - Reduced levels of consciousness are a late of sign of severe life threatening asthma. These children need urgent treatment.

Give immediate treatment and monitor response as flow chart. CALL FOR SENIOR ASSISTANCE IF YOU ARE CONCERNED.

Document findings to allow comparison before/ after treatment

All children and young people > 6years old who have a prior diagnosis of asthma or recurrent episodes of wheeze should try to undertake a peak flow. This can be compared to their usual peak flow and may give some indication of severity of the exacerbation.

There is limited evidence that undertaking peak flow in children / young people with new presentation of wheeze is likely to significantly contribute to management as there is no comparison. Taking a full history and examination will usually ensure a diagnosis is able to be made. Obtaining a peak flow may then add some information to the clinical picture.

Acute management

Bronchodilators

Children who require oxygen to keep oxygen saturations 92% or higher should be given nebulisers. Once oxygen saturations can be safely maintained at 92% or higher then bronchodilators are best given by spacers (a facemask may be required for younger children) (1,2,3). Only a very small proportion of children with moderate/severe asthma seen in the emergency department are unable to use spacers (3%) (4).

As first line treatment for children without significant hypoxia or features of life-threatening asthma use:

-10 puffs (100 micrograms per actuation) of inhaled salbutamol via a large volume spacer. Puffs (actuations) must be given separately into the spacer device and most children will require 20-30 seconds for each inhalation. Therefore 10 puffs should take approximately 5 minutes to deliver. Further management of the **non severe wheeze** patients can be found further on in this guideline.

For children with life threatening asthma or who require oxygen please use:

-2.5mg or 5mg of nebulised Salbutamol. (There is no absolute age criteria for dosage- 2.5mg for children <5yrs and 5mg for children over 5yrs is suggested (6).)All nebulisers should be driven with oxygen which is beneficial and safe in asthmatics and attenuates the drop in oxygenation associated with giving bronchodilator drugs (5).Salbutamol works rapidly and produces most of its bronchodilation within 15 minutes. Children with severe or life-threatening features should be

observed continuously. As nebulisers take between 8-10 minutes to 'run through' children may be having their second nebuliser before significant improvement is seen.

Reassess the child after salbutamol has been given and if no improvement this should be repeated. Salbutamol can be given every 20 minutes until an improvement is seen, the child must be reviewed after each dose. Children who continue to have signs and symptoms of acute severe or life-threatening asthma after either 2 nebulisers or 20 puffs of inhaled salbutamol will benefit from:

-Ipratropium bromide (atrovent) 2-6 puffs via a spacer or a nebulised dose of 125 micrograms (for children <2yrs) or 250 micrograms (2yrs to 18yrs) (7). This can be mixed with salbutamol if using a nebuliser. Frequent doses should be given every 20-30 minutes in the first 2 hours and it should be given 4 -6 hourly thereafter.

If no improvement is seen with inhaled bronchodilators, senior review **must** be obtained and second line treatments considered (see below).

Steroids

Children with an acute exacerbation of asthma should receive steroid treatment as early as possible.

-Oral prednisolone: 10mg < 2years, 20mg (2-5yrs) and 30-40mg >5 yrs has been shown to reduce the risk of admission to hospital (8) and prevent a relapse in symptoms after initial presentation (9). Maximum dose of oral prednisolone is 40mg.

If using prednisolone in the <2 yrs age group please ensure either: atopic history, preventer treatment already used or interval symptoms are present. Oral steroids are not used frequently in this age group and senior advice would be recommended if unclear history.

The limited available data suggest that intravenous steroids are no more effective than oral steroids in moderate to severe asthma (10, 11) and both begin to work within 3-4 hours. If required please give:

-Intravenous hydrocortisone (4mg/kg max dose 100mg). 4-6 hourly. IV treatment should therefore be reserved for children who are unable to tolerate oral fluids.

Intravenous treatment

Please note all monographs to aid in prescribing IV treatments are an appendix at end of this guideline.

In severe or life threatening exacerbations, bronchoconstriction may affect delivery of inhaled/nebulised medications to the airways. Either aminophylline or salbutamol can be used intravenously. Both require loading doses to be effective. Children receiving these should in Derby be in CED Resus, or Dolphin HDU setting whenever possible. In Burton, Children receiving these should be treated in ED resus or side room 1 or 2 on Ward 1. It is important to monitor serum electrolytes. Salbutamol also tends to be better tolerated, with less associated vomiting than aminophylline. However, in patients who have had large amounts of nebulised salbutamol already, their salbutamol receptors may be saturated and use of Aminophylline may be more appropriate as additional salbutamol may be ineffective. (12-16)

The initial loading dose of IV salbutamol is 5micrograms/kg for 1 month-2yrs and 15 micrograms/kg for 2-16yrs, over 5 minutes. Maximum dose of IV salbutamol is 250micrograms. Salbutamol can either be given as a single bolus or be followed by a continuous infusion (1-5 micrograms/kg/minute) (17). For young people who are clearly overweight or >50kg ideal body weight should be used to calculate doses rather than true weight to avoid excessive salbutamol use. Adult doses can also be used for these young people (please see monograph) For those children needing >3mcg/kg.min please inform consultant on call.

If using Intravenous aminophylline please give: 5mg/kg (max dose 500mg) followed by 1 mg/kg/hour for children up to 12yrs and 500-700 micrograms/kg/hr for children 12-18yrs. Loading doses of aminophylline should not be given if patients are on oral theophylline or aminophylline.

Intravenous magnesium sulphate is a safe and established treatment for acute asthma in adults (18). There is increasing experience of its use in childhood, with mounting evidence that IV magnesium can provide additional bronchodilation when given in conjunction with standard bronchodilating agents and corticosteroids (19).

The dose of IV magnesium is 40-50 mg/kg/day Maximum dose of magnesium is 2 grams. In patients with a good response initially who remain acutely wheezy further doses can be given but only after discussion with consultant on call.

If magnesium is used the patient must be discussed with the consultant on call.

History

There are several pieces of information which may be useful in the initial assessment.

Duration of episode, suspected trigger, treatment given so far

Past history of wheeze, - previous hospital attendances need for iv treatment / intubation/ HDU/ PICU

Usual medication e.g. theophylline and allergies

Investigations

A chest X-ray is not routine. If needed it should be undertaken after initial treatment and stabilisation is underway. This would usually mean a portable film in resus /HDU (Derby)or ward 1(Burton) or a medical escort to accompany the patient to the department. Portable films are of poorer quality.

CXR may be considered if:

This is a first episode of significant wheeze with hospital admission and IV treatment.

The patient is failing to improve with treatment.

Focal signs (wheeze/ reduced air entry) on examination which persist after several doses of bronchodilators e.g. concerns over asymmetry of wheeze or suspicion of foreign body.

Monitoring electrolytes

Salbutamol by any route will lower serum potassium by driving potassium intracellularly. It is important to monitor and treat accordingly – however, remember that total body potassium remains relatively normal and it is unusual for serum potassium to fall more than 2.0 mmol/l.

Magnesium treatment can lead to hypocalcaemia in some cases.

Discussion with PICU

Any deteriorating patients should be moved to Resus/ Dolphin HDU(Derby) / Sideroom 1 or 2 on ward 1(Burton). Patients with any of the following features should be discussed with PICU.

- 1) Life threatening features not responding to initial treatment e.g. poor respiratory effort, confusion, coma.
- 2) Persistent hypoxia
- 3) Consider discussion if child has needed PICU input previously
- 4) If patient has had IV salbutamol and iv aminophylline loading dose with no improvement

Management of non-severe wheeze:

Acute (non severe) wheeze in Children <2yrs of age :

(Commonly viral induced wheeze, may include "Happy Wheezers")

In this age group, there will be a large number of children that will continue to be wheezy, who do not respond to inhaled medications but are well, active, feeding as normal and the work of breathing is not significant. These children do not need to be on regular treatment if there was an assessment that it has not made any clinical impact. These parents need to be carefully safety-netted about signs and symptoms of increased work of breathing or deterioration.

For those children who are wheezy and do not fit the above description please follow the guidance below.

Acute (non severe) Wheeze in >2 year olds:

As noted above initial treatment:

-10 puffs (100 micrograms per actuation) of inhaled salbutamol via a large volume spacer. Puffs (actuations) must be given separately into the spacer device and most children will require 20-30 seconds for each inhalation. Therefore 10 puffs should take approximately 5 minutes to deliver.

- 1) The child needs to be reassessed by a clinician within 30 minutes to assess response.
- 2) If there is clear improvement and child stable, reassess in another 30 minutes.
- 3) If the child remains well with minimal work of breathing, no features of significant respiratory distress and observations remain stable, the child can be reviewed at 1,2 and 3 hours post last inhaler to ensure they are able to stretch to 4 hourly inhalers as tolerated.
- 4) If child does not show signs of improvement, or starts to deteriorate, follow management of severe asthma earlier in this guideline.
- 5) Once patient has been stretched to 3-4 hourly inhalers, they can be discharged home with safety netting advice and a plan to continue taking inhalers 3-4 hourly. If they deteriorate at home (not managing 3-4 inhalers/increased work of breathing/ unwell), they need to be reassessed in CED(Derby) or Burton ED or PAU - depending on place of discharge.

Use of oral steroids in non severe wheezy children

In a child 2-5 years of age, consider oral steroid at 1mg/kg if they have:

- 1) interval symptoms
- 2) previous hospital admissions with wheeze
- 3) history of atopy

In a child >5 years of age, give oral prednisolone at 1mg/kg if they have:

- 1) diagnosed asthma
 - 2) history of atopy
- or consider oral steroids if they have:
- 1) interval symptoms
 - 2) previous hospital admissions with wheeze

Discharging home from Children's Emergency Department/ Burton Emergency Department

Children with acute severe asthma will need admission. For the less severe children and ones that respond well to treatment it may be appropriate to discharge. Clearly, following treatment with salbutamol the child will feel better and the parents may want to take them home. However, it is well known that acute exacerbations of asthma are not brief and will not respond to a single dose of nebulised bronchodilator. Many children may need a period of observation on the short stay unit to ensure that they are managing 3-4 hours between salbutamol before they are discharged. Consider the following points when reaching a decision:

- Has the child shown a complete response to inhaled salbutamol?
- Has the child required admission previously and has taken time to respond or deteriorated?
- Does the child have appropriate inhaled treatment with devices that they can use at home?
- Does the patient/parent know how to recognise deterioration? Give precise instructions and indications for seeking further assistance.
- Time of day – are parents going to be able to monitor for any subsequent deterioration during the middle of the night.
- If there is any deterioration during the same exacerbation, parents should be instructed to return directly to Children's Emergency Department / Burton Emergency Department / PAU Burton (depending on place of discharge)
- Consider referral to Derby Paediatric Respiratory Nurses, who can follow up discharges from Children's Emergency Department and give further support and advice with regard to inhaler technique and management. Contact via : uhdb.childrensrespiratoryteam@nhs.net
- An asthma management plan must be given to everyone being discharged after an acute admission. (see appendix 1)
- Liaise with GP – Letter from Emergency Department, further advice on management e.g. treatment changes, OPD review.

Discharging home from the wards

It is difficult to develop strict pre-discharge criteria for asthmatics as this will depend on individual responses in very different circumstances but the following may be useful guidelines:

- No need for nebuliser in past 8 -12 hours (particularly at night)
- Oxygen saturation > 92% in air
- Able to use usual inhalers effectively and not requiring so frequently that readmission is highly likely (more often than 3-4hrly)
- Parents able to detect any deterioration and act appropriately
- If problems occur < 24 hours of discharge – discuss with hospital staff rather than GP
- Review treatment and symptoms prior to admission, consider need to adjust preventer
- Ensure patients have a course of 3-5 days of oral prednisolone as a TTO and enough inhalers for home.

- For children discharged from Derby please refer to Paediatric Respiratory Nurses,(uhdb.childrensrespiratoryteam@nhs.net) who will follow up all asthma discharges from the ward within 2 weeks and give further support and advice with regard to inhaler technique and management. If discharged from Burton, please ensure follow up arranged with GP practice asthma nurse within 2 weeks.

Sometimes admissions are suggestive of poor underlying asthma control. A review of interval symptoms, compliance and inhaler technique should be undertaken before discharge and this should be recorded on the "Asthma Discharge Bundle" Sticker in Derby or on V6 in Burton.

Use the admission as an opportunity for further education about asthma and management. Provide a written action plan. (See end of guideline) Ensure there is a plan for follow up (with GP, asthma nurse or hospital outpatients)

Advice to parents if returning home:

- Give salbutamol up to 10 puffs 3-4 hourly by spacer
- If not improving within 24-48 hours, then to return for review
- If worsening (i.e needs inhalers more than 3 hourly or just managing 3 hourly repeatedly, to go to CED/ Emergency department.
- Reduce numbers of puffs gradually to 2 puffs (every 4 – 6 hours) of inhaled salbutamol as wheeze improves.

Management of recurrent wheeze

(Defined as: More than 3 episodes of wheeze in a 3 month period.)

All children with recurrent wheeze should have a written management plan¹.

Management of recurrent wheeze in children <5yrs

1) Wheeze *only when unwell with viral illness*. No interval symptoms. No history of atopy in family or in patient: ("Recurrent Viral Wheeze")

- Re-iterate advice about up to 10puffs 3-4hrly salbutamol (can also try atrovent if any benefit seen)
- Consider trial of Montelukast (dose as per cBNF) initially for 4-8 weeks and continued regularly over winter months if improvement seen.

2) Wheeze with viral illness but *also has interval symptoms* (e.g. wheeze on exercise, coughing at night) or history of atopy: ("Multi trigger wheeze")

- Consider diagnosis of asthma if definite reversibility of symptoms with use of salbutamol but unlikely under 5yrs old.
- Re-iterate advice about up to 10puffs 3-4hrly salbutamol (atrovent less likely to be of benefit)
- Consider trial of either
 - Montelukast (dose as per cBNF) regularly
 - Inhaled beclomethasone (dose as per cBNF) via spacer
 - Note that steroid inhaler use is only of benefit if taken regularly and has a slower onset of effect than Montelukast.

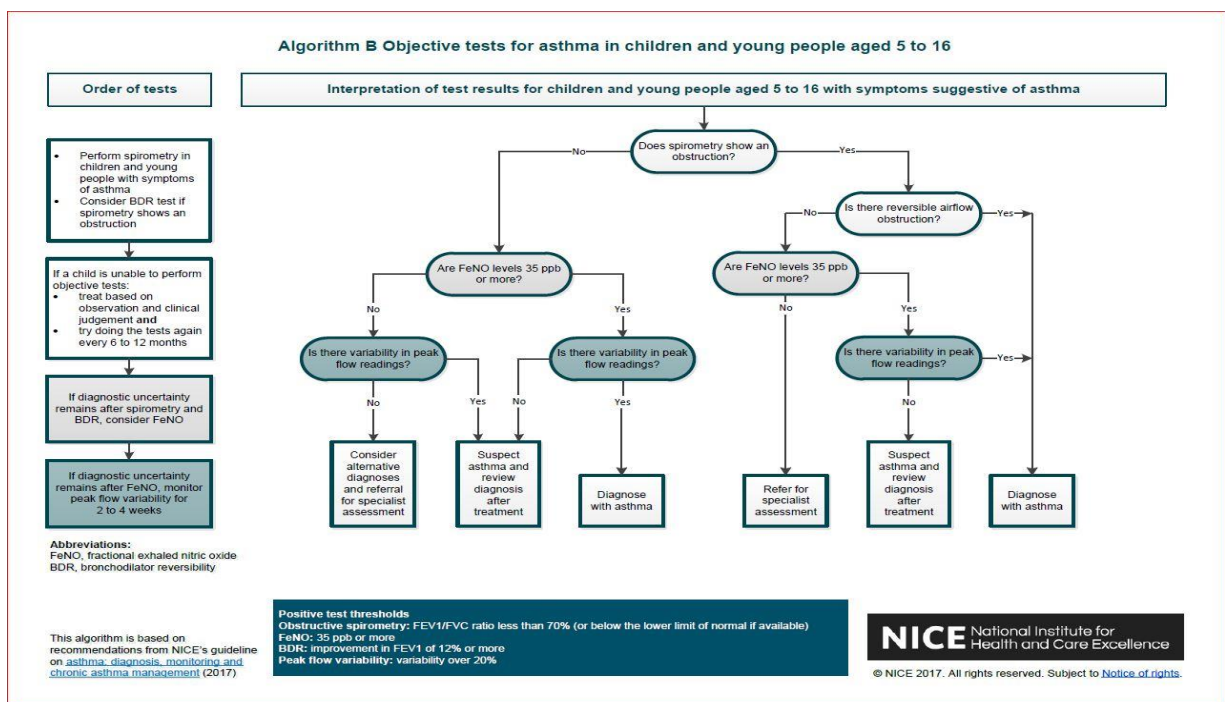
¹RCP, National Review of Asthma deaths. <https://www.asthma.org.uk/globalassets/campaigns/nrad-executive-summary.pdf>. Page 9.

- If no improvement with above, escalate treatment as per BTS guideline
- If still no improvement after escalation, refer to paediatric OPD for review.

Management of recurrent wheeze in children and young people >5 years

Less likely to be pure viral induced wheeze, look for atopic/asthmatic component.

- Ensure full history and examination
- PEFR diary to look for variability (supportive of asthma diagnosis)
- Other investigations i.e. spirometry or FeNO if available can be carried out, as suggested by the BTS guidance – these can be accessed via the pediatric respiratory nurses in Derby and by OPD paediatric nurse in Burton, to aid in diagnosis.



If history and examination support asthma diagnosis:

Treatment as per BTS guideline and escalate as required i.e.

1. Inhaled salbutamol
2. Add Inhaled corticosteroid 200-400mcg/day
3. Add Inhaled LABA
4. Add Montelukast
5. Refer for specialist care. i.e. Paediatric Asthma Clinic.

Please see link for detailed guidance :

<https://www.brit-thoracic.org.uk/quality-improvement/guidelines/asthma/>

See Appendix 4 for the full below document.

You could take a photo of your asthma Action Plan and keep it on your mobile

MY ASTHMA ACTION PLAN

Date Plan Made:
.....

Name:
DOB:
Preventer: Reliever:



MY ASTHMA IS WELL CONTROLLED

- Little or no cough or wheeze
- Sleeping not disturbed
- You are able to do your usual activities
- If you check your peak flow it is around your best
- Best peak flow

ACTION

*Take your preventer inhaler
.....
every day, even when well*

You should not be needing your reliever inhaler every 4 hours but can take it with activities

YOUR ASTHMA NURSE:

.....
.....

Telephone number:

.....



MY ASTHMA IS GETTING WORSE

- You may have a cold/hay fever
- Coughing and wheezing day and/or night
- If things do not settle within 48 hours then seek a medical review with your GP
- Your peak flow may be reduced

ACTION

*Keep taking your usual medication and inhalers.

Take your usual dose of blue inhaler (reliever) every 4 hours*



MY ASTHMA IS MUCH WORSE

I AM HAVING AN ASTHMA ATTACK

- You can't talk or walk easily
- You are breathing hard and fast
- You are coughing/ wheezing a lot
- Your blue inhaler is not working
- You are too breathless to do a peak flow

ACTION

Take up to 10 puffs of your blue inhaler through your spacer

Repeat every 3-4 hours and seek medical help.

IF this is not working repeat 10 puffs sooner

THIS IS AN EMERGENCY CALL 999

Paediatric Asthma Discharge Bundle

Signature and Print Name

Date

Inhaler technique checked	.....	.....
Medical medication review	.....	.....
Adherence discussed	.....	.....
Written action plan provided	.....	.....
Asthma triggers discussed	.....	.....

e.g . smoking/ exposure to smoke, pollens, viruses, exercise :

Triggers Identified.....

Follow up arranged

Advised review in primary care in next 2 -7 days

Respiratory nurse clinic follow up in 2 weeks (Appointment details.....)

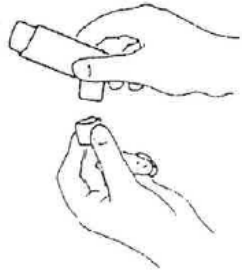
Any additional medical follow up (Appointment details)

Emergency treatment via spacer device

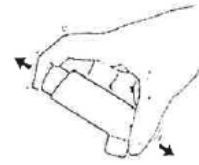
1. Put two parts of spacer together



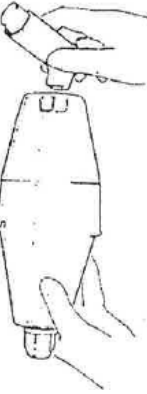
2. Remove cap of inhaler



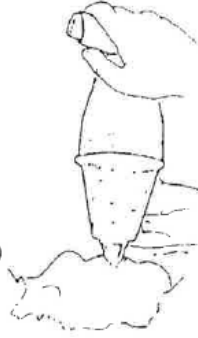
3. Shake inhaler



4. Insert inhaler into flat end of device



5. Place mouthpiece in patient's mouth and press inhaler canister to release a dose of reliever medication. Tell the patient to breathe in and out. Repeat with device in mouth, allowing 4-5 breaths between actuations



6. Shake inhaler between every two actuations
7. Remove device from mouth when patient has recovered

SEEK HELP IF CONDITION IS NOT RELIEVED WITHIN 5 MINUTES

WHILE HELP IS BEING SOUGHT REPEAT STAGES 5-6

© NARTC

6. References (including any links to NICE Guidance etc.)

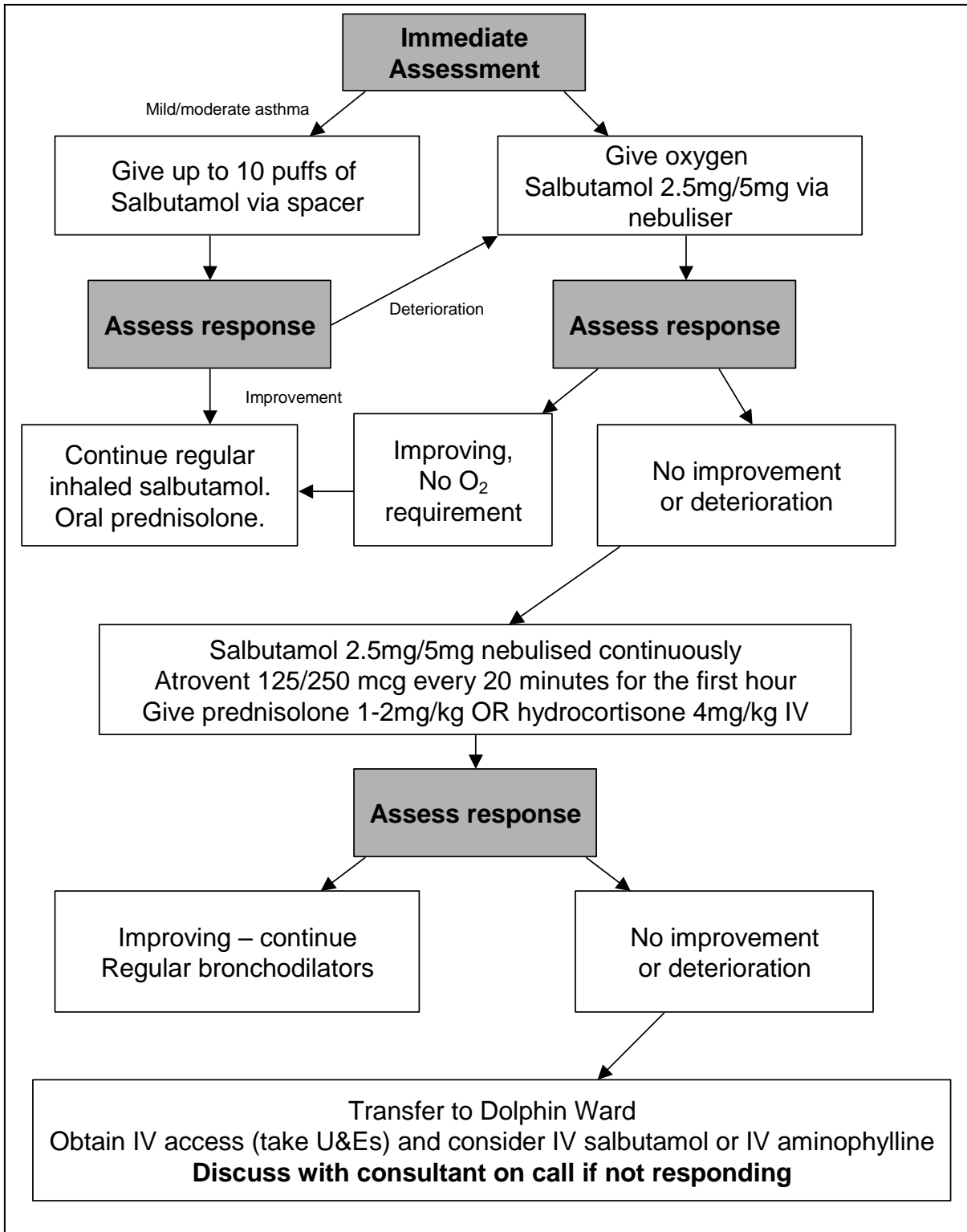
1. Cates CJ, Crilly JA, Rowe BH. Holding chambers (spacers) versus nebulisers for beta-agonist treatment of acute asthma. *Cochrane Database of Systematic Reviews* 2006, Issue 2. Art. No.: CD000052.
2. Dewar AL, Stewart A, Cogswell JJ. A randomised controlled trial to assess the relative benefits of large volume spacers and nebulisers to treat acute asthma in hospital. *Arch Dis Child* 1999;80:421-3.
3. Benito-Fernandez J, Gonzalez-Balenciaga M, Capape-Zache S, Vazquez-Ronco MA, Mintegi-Raso S. Salbutamol via metered-dose inhaler with spacer versus nebulization for acute treatment of pediatric asthma in the emergency department. *Pediatr Emerg Care* 2004;20:656-9.
4. Powell CV, Maskell GR, Marks MK. Successful implementation of spacer treatment guideline for acute asthma. *Arch Dis Child* 2001;84:142-6.
5. Duarte M, Camargos P. Efficacy and safety of a home-made non-valved spacer for bronchodilator therapy in acute asthma. *Acta Paediatrica* 2002;91:909-13.
6. Lenney W, Alexander J. The management of acute severe asthma. In: Silverman M, ed. *Childhood asthma and other wheezing disorders*. London: Arnold, 2002:359-375.
7. Rodrigo GJ, Castro-Rodriguez JA. Anticholinergics in the treatment of children and adults with acute asthma: a systematic review with meta-analysis. *Thorax* 2005;60:740-6
8. Rowe BH, Spooner C, Ducharme FM, Bretzlaff JA, Bota GW. Early emergency department treatment of acute asthma with systemic corticosteroids. *Cochrane Database of Systematic Reviews* 2001, Issue 1.
9. Rowe BH, Spooner CH, Ducharme FM, Bretzlaff JA, Bota GW. Corticosteroids for preventing relapse following acute exacerbations of asthma. *Cochrane Database of Systematic Reviews* 2001, Issue 1.
10. Becker JM, Arora A, Scarfone RJ, Spector ND, Fontana-Penn ME, Joffe GE, Goldsmith DP, Malatack JJ. Oral versus intravenous corticosteroids in children hospitalised with asthma. *JACI* 1999;103:586-90.
11. Barnett PL, Caputo GL, Baskin M, Kuppermann N. Intravenous versus oral corticosteroids in the management of acute asthma in children. *Ann Emerg Med* 1997;29:212-7.
12. Bohn D, Kalloghlian A, Jenkins J, Edmonds J, Barker G. Intravenous salbutamol in the treatment of status asthmaticus in children. *Crit Care Med* 1984;12:892-6.
13. Browne GJ, Penna AS, Phung X, Soo M. Randomized trial of intravenous salbutamol in early management of acute severe asthma in children. *Lancet* 1997;349:301-5.
14. Browne GJ, Lam LT. Single-dose intravenous salbutamol bolus for managing children with acute severe asthma in the emergency department: reanalysis of the data. *Ped Crit Care Med* 2002;3:117-23.
15. Browne GJ, Trieu L, Van Asperen P. Randomized, double-blind, placebo-controlled trial of intravenous salbutamol and nebulized ipratropium bromide in early management of severe acute asthma in children presenting to an emergency department. *Crit Care Med* 2002;30:448-53.

16. Sellers WFS, Messahel B. Rapidly repeated intravenous boluses of salbutamol for acute severe asthma. *Anaesthesia* 2003;58:680-3.
17. Habashi D, Browne GJ, Lam LT. The administration of β 2-agonists for paediatric asthma and its adverse reaction in Australian and New Zealand ED. A cross-sectional survey. *Eur J Emerg Med* 2003;10:174-8.
18. Rowe BH, Bretzlaff JA, Bourdon C, Bota GW, Camargo CA. Magnesium sulfate for treating exacerbations of acute asthma in the emergency department. *Cochrane Database of Systematic Reviews* 2000, Issue 1. Art. No.: CD001490
19. Cheuk DKL, Chau TCH, Lee SL. A meta-analysis on intravenous magnesium sulphate for treating acute asthma. *Arch Dis Child* 2005;90:74-77.
20. Scarfone RJ, Loiselle JM, Joffe MD, et al. A randomised trial of magnesium in the emergency department treatment of children with asthma. *Ann Emerg Med* 2000;36:572-8.
21. British Thoracic Society/Scottish Intercollegiate Guidelines Network. British Guideline on the Management of Asthma. *Thorax* 2003;58 (Suppl I):i1-i94.
22. British National Formulary for Children, 2016-17, accessed online via www.medicinescomplete.com, 6/1/17
23. Medusa Injectable Medicines Guide, accessed via <http://medusa.wales.nhs.uk>, 6/1/17

7. Documentation Controls

Development of Guideline:	Dr D Traves, Consultant Paediatrician Derby & Dr Chhavi Goel, Consultant Paediatrician Burton
Consultation with:	Derby and Burton Paediatricians and Clinical Pharmacists in Derby and Burton
Approved By:	<i>Paediatric Business Unit Guidelines Group, Women and Children's Division – 27th August 2020</i>
Review Date:	August 2023 – Extended to March 2024
Key Contact:	Dr D Traves, Consultant Paediatrician Derby & Dr Chhavi Goel, Consultant Paediatrician Burton

8. Appendix 1- Acute Asthma Management Flow Chart



Appendix 2: Asthma medicines required for children (>2 years)

Agent	Dose	Instructions
Salbutamol (inhaled)	Up to 10 puffs (1 mg)	Give each puff separately
Salbutamol (nebulised)	2.5mg/5mg	Consider 5mg dose for over 5yrs
Salbutamol (IV loading)	15 micrograms/kg (maximum 250 micrograms)	Dilute to 50 micrograms per ml with water for injections. Give over 5 minutes
Salbutamol (IV maintenance)	1-5 micrograms/kg/min	Start at 1mcg/kg/min and adjust dose to response Use 200 micrograms per ml infusion (see protocol CH PH D 14)
Ipratropium bromide (inhaled)	40 micrograms (2 puffs) QDS	
Ipratropium bromide (nebulised)	125micrograms/ 250 micrograms	3 doses in the first hour of severe asthma and then 4-6 hourly
Magnesium sulphate (IV) (magnesium sulphate 50%= 500mg per ml)	40mg/kg (maximum 2g) over 20 minutes	Consider this only after d/w consultant Dilute to 100mg per ml with sodium chloride 0.9%
Prednisolone (soluble)	1-2mg/kg once daily	Maximum 40mg per dose
Hydrocortisone (IV)	4 mg/kg four times daily	Maximum 100mg per dose
Aminophylline (IV loading) Ensure patient not taking oral theophylline or aminophylline	5mg/kg (max 500mg) over 20 minutes	Use 1mg per ml infusion (see protocol CH PH D 02)
Aminophylline (IV maintenance)	2-9 years 1mg/kg/hour 9-16 years 0.8mg/kg/hour >16 years 0.5mg.kg/hour	Use 1mg per ml infusion (see protocol CH PH D 02)

Appendix 3 Associated Drug Monograph

- a. [Salbutamol Monograph](#)
- b. [IV Magnesium Monograph](#)
- c. [Aminophylline Monograph](#)

Appendix 4 – Asthma Advice Sheet



You could take a photo of your asthma Action Plan and keep it on your mobile

MY ASTHMA ACTION PLAN

Date Plan Made:
.....

Name:

DOB:

Preventer: Reliever:

.....

“Remember to shake the inhaler before each puff when using with a spacer”



MY ASTHMA IS WELL CONTROLLED

- Little or no cough or wheeze
- Sleeping not disturbed
- You are able to do your usual activities
- If you check your peak flow it is around your best
- Best peak flow

ACTION

Take your preventer inhaler

.....

every day, even when well

You should not be needing your reliever inhaler every 4 hours but can take it with activities

YOUR ASTHMA NURSE:

.....

Telephone number:

.....



MY ASTHMA IS GETTING WORSE

- You may have a cold/hay fever or
- Coughing and wheezing day and/or night or
- Your peak flow may be reduced

ACTION

Keep taking your usual medication and inhalers.

Take your usual dose of blue inhaler (reliever) every 4 hours

If things do not settle within 48 hours, then seek a medical review with your GP



MY ASTHMA IS MUCH WORSE

I AM HAVING AN ASTHMA ATTACK

- You can't talk or walk easily or
- You are breathing hard and fast or
- You are coughing/ wheezing a lot or
- Your blue inhaler is not working or
- You are too breathless to do a peak flow

ACTION

Take up to 10 puffs of your blue inhaler through your spacer

Repeat every 3 - 4 hours

IF this is not working repeat 10 puffs. **IF** this is not lasting 3 hours see GP/DOCTOR **URGENTLY**

If giving blue inhaler **less than** every 2 hours call **999**

THIS IS AN EMERGENCY CALL 999

Discharge advise

Reducing Plan for the use of Reliever (Blue Inhaler)

Severity	
Mild	Moderate
Reliever Salbutamol (Blue) Inhaler Dose for Next Four Days:	
Day 1 - 2-4 puffs, 6-hourly	Day 1 - 4-6 puffs, 4-hourly
Day 2 - As required	Day 2 - 4-6 puffs, 6-hourly
Day 3 - As required	Day 3 - 4-6 puffs, 8-hourly
Day 4 - As required	Day 4 - 2-4 puffs as required
Thereafter, reliever salbutamol (blue) inhaler should be given on an 'as required' basis	
Prednisolone Dose:	
3 days	5-7 days
Dose:	Dose:
Number of Days:	Number of Days:

Important Contact Details

For online advice: Visit NHS Choices at www.nhs.uk

For telephone advise: Call NHS 111

Contact 111 for advise OR to book a GP Out of Hours Appointment

Available 24 hours / 7 days a week

Royal Derby Hospital

Children's Respiratory Nurse Office: 01332 787993

Answerphone in place (Please leave a message)

Monday-Thursday (No Friday cover) 08.30/09.00am-16.30/18.00pm

Burton Hospital

Children's Clinic 01283 511511 Ext 4631

Monday-Friday 09.00am-17.00pm

Children's Wards 01283 593233 24hrs/7 days a week

Asthma Advice - Information for patients, parents & carers

What is Asthma?

Asthma is caused by inflammation of the airways. These are the small tubes, called bronchi, which carry air in and out of the lungs. If you have asthma, the bronchi will be inflamed and more sensitive than normal. Asthma can start at any stage, but it most commonly starts in childhood. At least 1 in 10 children, and 1 in 20 adults, have asthma. In an asthma attack the muscles of the air passages in the lungs go into spasm and the linings of the airways swell. As a result, the airways become narrowed and breathing becomes difficult.

What Causes Asthma in Children?

In young pre-school children, wheezing is usually brought on by a viral infection – causing a cold, ear or throat infection. Some people call this ‘viral-induced wheeze’ or ‘wheezy bronchitis’, whilst others call it asthma. Most children will grow out of it, as they get to school age. In older children, viruses are still the commonest cause of wheezing. But other specific triggers may also cause an asthma attack such as:

- An allergy e.g. animals
- Pollens and mould particularly in hay fever season
- Cigarette smoke
- Extremes of temperature
- Stress
- Exercise (however, sport and exercise are good for you if you have asthma. If necessary, an inhaler can be used before exercise to prevent symptoms from developing)

Your Child May be having an asthma attack if any of the following happen

- Their reliever isn't helping or lasting over four hours
- Their symptoms are getting worse (cough, breathlessness, wheeze or tight chest)
- They are too breathless or it's difficult to speak, eat or sleep
- Their breathing may get faster and they feel like they can't get their breath in properly
- Young children may complain of a tummy ache

What to do if your child does have an asthma attack;

1. Give your child 1-2 puffs of their reliever inhaler (usually blue), immediately – use a spacer if needed.
2. Get your child to sit down and try to take slow, steady breaths. Keep them calm and reassure them.
3. If they do not start to feel better, give them two puffs of their reliever inhaler (one puff at a time) every two minutes. They can take up to ten puffs.
4. If they do not feel better after taking their inhaler as above, or if you are worried at any time, call 999.
5. If an ambulance does not arrive within 10 minutes and they are still feeling unwell, repeat step 3.

If your child's symptoms improve and you do not need to call 999, you still need to take them to see a doctor or asthma nurse within 24 hours of an asthma attack. Most people who have asthma attacks will have warning signs for a few days before the attack. These include having to use the blue reliever inhaler more often; changes in peak flow meter readings, and increased symptoms, such as waking up in the night. Don't ignore these warning signs as they indicate that your child's asthma control is poor and they risk having a severe attack.



Using a spacer device with your child



This information sheet will help you understand a spacer device, the benefits of using one, and how to use a spacer with your child.

What is a spacer/volumatic? A spacer is a plastic chamber, which helps to deliver medicine to the lungs. When inhalers & spacers are used together they make the medicine more effective. A **Volumatic** is a large clear spacer & comes in two parts; it needs to be put together before use. Children under 3 years will need the mask to be attached onto the mouth piece. Older children using the mouth piece should make the valve click each time they breathe in & out.

An **Aerochamber Plus** is a small colourful spacer. The orange & yellow ones have a mask. The flap in the mask should move when your child breathes in and out. If it doesn't, reposition the mask to create a seal around their nose & mouth. When using the blue **aerochamber** with a mouth piece, if your child is breathing in correctly you should not hear a musical noise.

Why spacers are important? Spacers are very important because: Regardless of your child's age aerosol inhalers are not effective when used on their own, the spacer makes them more effective. If your child is prescribed a steroid inhaler (preventer medicine), spacers help to reduce the risk of oral thrush by reducing the number of large droplets that reach the mouth. The risk of oral thrush can be further reduced by cleaning your child's teeth or wiping their face if using the mask after their preventer.

How to look after your spacer When you first get the spacer, using a soft cloth, bowl of warm water & washing up liquid wash it inside and out (the **Aerochamber plus** needs to be left in the soapy water for 15 minutes). After cleaning remove the spacer from the soapy water. Rinse the mask / mouth piece in fresh water but do not rinse the inside of the spacer. Instead leave it to drip-dry. Washing spacers in this way stops the medicine from sticking to the sides. When the spacer is clean & dry allow your child to play with it.

Aerochamber plus spacers - need to be washed once a week following the guidance above. They should be replaced at least every 2 years if you use them every day.

Volumatic spacers - need to be washed once a month following the guidance above. They should be replaced at least every 6 months if you use them every day.

How do I use a spacer with my child? 1. Shake the inhaler well. 2. Fit the inhaler into the hole at the end of the spacer. 3. If your child is 3 years old or above place the mouth piece between your child's teeth & get them to close their lips. For children under 3 years place the mask over their face to create a seal around the nose and mouth. 4. Press the inhaler once and allow your child to take five breaths in and out of the spacer if your child is using the mouth piece. If your child is using a mask, count out loud to 10. 5. Remove the spacer from your child's mouth / face.

Repeat steps 1 to 5 for each puff. The doctor, nurse or pharmacist will tell you how many puffs are needed and how often you need to give it. Always check with them if you are not sure and ask them to write it down. Remember... Only put one puff of medicine into the spacer at a time. If you put in more than one puff, the droplets of spray stick together and coat the sides of the spacer which means your child won't breathe them in.