Management of acute asthma in children in emergency department

Age 2-5 years

ASSESS ASTHMA SEVERITY

Moderate asthma

- SpO2 ≥92%
- No clinical features of severe asthma

NB: If a patient has signs and symptoms across categories, always treat according to their most severe features

Severe asthma

- SpO2 <92%
- Too breathless to talk or eat
- Heart rate >140/min
- Respiratory rate >40/min
- Use of accessory neck muscles

Life-threatening asthma

SpO2 <92% plus any of:

- Silent chest
- Poor respiratory effort
- Agitation
- Altered consciousness
- Cyanosis

Moderate asthma – treatment

- β_2 agonist 2-10 puffs via spacer ± facemask (given one puff at a time inhaled separately using tidal breathing)
- Give one puff of β_2 agonist every 30-60 seconds up to 10 puffs according to response
- Consider soluble oral prednisolone 20 mg

Reassess within 1 hour

Severe and life-threatening asthma

Oxygen via face mask/nasal prongs to achieve SpO2 94-98%

Severe asthma – treatment

- β_2 agonist 10 puffs via spacer ± facemask or nebulised salbutamol 2.5 mg
- Soluble prednisolone 20 mg or IV hydrocortisone 4 mg/kg
- **If poor response** add 0.25 mg nebulised ipratropium bromide
- Repeat β_2 agonist and ipratropium up to every 20 minutes for 2 hours according to response

Life-threatening asthma – treatment

- Nebulised β_2 agonist: salbutamol 2.5 mg **plus** ipratropium bromide 0.25 mg nebulised
- Oral prednisolone 20 mg or IV Hydrocortisone 4 mg/kg if vomiting

Discuss with senior clinician, PICU team or paediatrician

- Repeat bronchodilators every 20-30 minutes

DISCHARGE PLAN

- Continue β_2 agonist 4 hourly as necessary
- Consider prednisolone 20 mg daily for up to 3 days
- Advise to contact GP if not controlled on above treatment
- Provide a written asthma action plan
- Review regular treatment
- Check inhaler technique
- Arrange GP follow up

Arrange immediate transfer to PICU/HDU if poor response to treatment

Admit all cases if features of severe exacerbation persist after initial treatment

Age >5 years

ASSESS ASTHMA SEVERITY

Moderate asthma

- SpO2 ≥92%
- PEF ≥50% best or predicted
- No clinical features of severe asthma

NB: If a patient has signs and symptoms across categories, always treat according to their most severe features

Severe asthma

- SpO2 <92%
- PEF 33-50% best or predicted
- Heart rate >125/min
- Respiratory rate >30/min
- Use of accessory neck muscles

Life-threatening asthma

SpO2 <92% plus any of:

- PEF <33% best or predicted
- Silent chest
- Poor respiratory effort
- Altered consciousness
- Cyanosis

Moderate asthma – treatment

- β_2 agonist 2-10 puffs via spacer and mouthpiece (given one puff at a time inhaled separately using tidal breathing)
- Give one puff of β_2 agonist every 30-60 seconds up to 10 puffs according to response
- Oral prednisolone 30-40 mg

Reassess within 1 hour

Severe and life-threatening asthma

Oxygen via face mask/nasal prongs to achieve SpO2 94-98%

Severe asthma – treatment

- β_2 agonist 10 puffs via spacer or nebulised salbutamol 5 mg
- Oral prednisolone 30-40 mg or IV hydrocortisone 4 mg/kg if vomiting
- **If poor response add 0.25 mg nebulised ipratropium bromide**
- Repeat β_2 agonist and ipratropium up to every 20 minutes for 2 hours according to response

Life-threatening asthma – treatment

- Nebulised β_2 agonist: salbutamol 5 mg **plus** ipratropium bromide 0.25 mg nebulised
- Oral prednisolone 30-40 mg or IV Hydrocortisone 4 mg/kg if vomiting

Discuss with senior clinician, PICU team or paediatrician

- Repeat bronchodilators every 20-30 minutes

DISCHARGE PLAN

- Continue β_2 agonist 4 hourly as necessary
- Consider prednisolone 30-40 mg daily for up to 3 days
- Seek medical advice if not controlled on above treatment
- Provide a written asthma action plan
- Review regular treatment
- Check inhaler technique
- Arrange GP follow up

Arrange immediate transfer to PICU/HDU if poor response to treatment

Admit all cases if features of severe exacerbation persist after initial treatment

Paediatric Asthma/Recurrent Wheeze Integrated Care Pathway

NHS Greater Glasgow and Clyde

Unit No.	D.O.B.
CHI	
Name	
Address	Affix Label

Date: ______________________ Primary Carer: ______________________

Time of Triage: ______________________ Next of Kin: ______________________

A&E Discriminator: ______________________ Tel No: ______________________

Triage Category: ______________________ GP: ______________________

Nurse: ______________________ School/ Nursery: ______________________

Allergies: ______________________

TRIAGE FLOW CHART – Classify patients by most severe features

RED ← YES

- Saturation <92% in O2
- Poor respiratory effort
- Cyanosis
- Silent Chest
- Unresponsive
- Confusion
- PFR < 33% best or predicted Peak Flow Rate

↓ NO

ORANGE ← YES

- Saturation <92% in air
- Cannot complete sentences
- Heart rate < 5yrs >130 bpm; > 5yrs >120 bpm
- PFR < 50% of best or predicted PFR
- Respiratory Rate < 5yrs > 50 / min; > 5yrs > 30 / min

↓ NO

YELLOW ← YES

- Saturation >92% in air
- Wheeze
- Significant history of asthma
- No improvement with own medicine

RESUS ☐ **NON RESUS** ☐ | Time seen by A&E Doctor: ☐ Time of referral to Paediatrician: ☐

CLASSIFICATION:

RED	LIFE THREATENING	SEE IMMEDIATELY
ORANGE	SEVERE	WITHIN 10 MIN
YELLOW	MILD / MODERATE	WITHIN 1 HR

NURSE ASSESSMENT

Observations: Respiratory Rate: ☐ Heart Rate: ☐ Temperature: ☐

Oxygen saturation: Initial Sa02 ☐ In air? → No ☐ O_2 Flow in ☐ L/min Via Facemask ☐

Facemask / Bag ☐

↓ Yes ☐ Nasal Cannulae ☐

PEAK FLOW MEASUREMENT (PFR)

Peak Flow measurement now (attempt only if child is greater than 5 years) = ☐ L/min A

If the child has previously used a PFR meter, what was their best recent value when well = ☐ L/min B

If no recent PFR known, check child's height then calculate predicted PFR for height (see wall chart) = ☐ L/min C

Height = ☐ cm

Then calculate % predicted PFR for height / measurement

$$\% \text{ PFR now} = \frac{\text{Patients PFR now (A)}}{\text{Best (B) or predicted (C) PFR}} \times 100 = \quad \%$$

MEDICAL ASSESSMENT

A&E DR ☐ PAEDIATRIC DR ☐ Other: ____________

SEEN BY: ____________ SIGNATURE: ____________ TIME: ____________

HISTORY

Chronic symptoms

	With exercise	Day	Night	Night wakening
Cough:	☐	☐	☐	☐
Wheeze:	☐	☐	☐	☐
Shortness of breath on exertion (S.O.B.):	☐	☐	☐	☐

With this attack

	With exercise	Day	Night	Night wakening
Cough:	☐	☐	☐	☐
Wheeze:	☐	☐	☐	☐
S.O.B. on exertion:	☐	☐	☐	☐

IN THE LAST YEAR

Number of A&E asthma/wheeze attendances: ☐

Number of admissions with asthma/wheeze: ☐

Number of courses of antibiotics for chest infections: ☐

Number of courses of oral steroids ☐

Currently attend hospital clinic? Y ☐ N ☐

Currently attend GP for asthma? Y ☐ N ☐

TRIGGERS / OTHER POINTS IN HISTORY

USUAL MEDICINES

Drug	Dose	Frequency	Route / Device	Delivery System
Reliever:				
Preventer (s):				
Other:				

EXAMINATION

1. Breathlessness: Not breathless ☐ Breathless on exercise ☐ Breathless at rest ☐ Exhausted ☐
2. Able to speak/babble: Easily ☐ With difficulty ☐ Only short sentences ☐ Unable ☐
3. Use of accessory muscles: No ☐ Yes ☐

Chest auscultation / rest of examination positive findings

DIAGNOSIS / ADDITIONAL MEDICAL NOTES

MANAGEMENT: **Note if under 2 years of age or moderate or severe - discuss with middle grade**

Doses of systemic steroids:	<2 years	2-5 years	> 5 years
Prednisolone (oral, once daily for a minimum of 3 days)	10mg	20mg	30-40mg
OR Hydrocortisone (IV six hourly)	25mg	50mg	100mg

MILD / MODERATE

- B_2 agonist 2-10 puffs via spacer
- Reassess after 15 minutes

If responds:

- Continue inhaled B_2 agonist 1-4 hourly
- Consider adding systemic steroid as above
- Home discharge criteria (see next page)

If not responding:

- Give second dose B_2 agonist
- Give systemic steroid as above
- Admit to Short Stay Ward (SSW) / hospital

NB: IF POOR RESPONSE TO SECOND DOSE B_2 AGONIST TREAT AS SEVERE

SEVERE

- Nebulised B_2 agonist with oxygen as driving gas
  < 5 yrs 2.5mg Salbutamol or 5mg Terbutaline
  > 5 yrs 5 mg Salbutamol or 10mg Terbutaline
- Continue 0_2 via face mask / nasal prongs
- Systemic steroids as above
- *If responds:* continue nebulised B_2 agonist, (doses can be repeated every 20-30 minutes)
- Arrange admission
- *If not responding:* give second dose nebulised B_2 agonist immediately

If still not responding: TREAT AS LIFE THREATENING

LIFE THREATENING – TREAT AS SEVERE PLUS THE FOLLOWING:

- Discuss with senior clinician (consultant, PICU team or paediatric team)
- Consider CXR and blood gases
- Nebulised B_2 agonist and nebulised Ipratropium bromide 250 micrograms, mixed together (can be repeated every 20 – 30 minutes)
- Bolus of 5mg / kg aminophylline over 20 minutes followed by an infusion of 0.9mg /kg/hr (in 0.9% sodium chloride or 5% dextrose) (As per Roberts G, Thorax, 2003; 58:306-310 which supersedes earlier 2003 BTS Guidelines)

NB: ARRANGE IMMEDIATE TRANSFER TO PICU/HDU IF POOR RESPONSE TO TREATMENT.
ADMIT ALL CASES IF FEATURES OF SEVERE EXACERBATION PERSIST AFTER INITIAL TREATMENT
(AS PER ANNEX 6 OF BTS GUIDELINES 2003).
(PROTOCOLS AVAILABLE FOR IV SALBUTAMOL & IV MAGNESIUM; CONSULTANT DECISION)

PRESCRIBED DRUGS & ADMINISTRATION **WEIGHT:** Kg

Date	Time	Drug	Dose	Route / Device	Prescribers Signature	Administered by Signature	Time

CLINICAL ASSESSMENT

After treatment		1st Bronchodilator		2nd Bronchodilator		3rd Bronchodilator		4th Bronchodilator	
		Time:		Time:		Time:		Time:	
Pulse									
Respirations									
SA 02									
PFR	Pre:								
PFR	Post: (15mins)								
Temp	If initial temp >37.5 repeat hourly	Time: Temp:	Time: Temp:	Time: Temp:	Time: Temp:	Time: Temp:	Time: Temp:		

INVESTIGATIONS / RESULTS - IF DONE:

Chest X-Ray: ☐ ____________________

Bloods: ☐ ____________________

____

Other: ☐ ____________________

NURSING NOTES:

HOME DISCHARGE CRITERIA

- Will be stable on 3-4 hourly inhaled bronchodilators that can be continued at home (multidosing)
- PFR >75% of best or predicted (which ever is higher)
- SaO_2 >94%

NB: LOWER THRESHOLD FOR ADMISSION IF:

- Attack in late afternoon
- Recent hospital admissions or previous severe attack
- Concern over social circumstances or ability to cope at home

NURSING STAFF TO COMPLETE FOR A/E, SSW & INPATIENT

DISCHARGE MEDICATION

	Drug	Strength / Dose	Route / Device	Frequency
Reliever				
Preventer (s)				
Steroid	**Prednisolone**			
Other				

DISCHARGE PROTOCOL (delete as appropriate – if no action taken please explain)

DEVICES

Nursing staff demonstrate multidosing technique	Yes / No	
Parent demonstrate multidosing technique	Yes / No	
Patient / Parent education on asthma medication	Yes / No	
Information given 1. Going Home with Asthma Booklet	Yes / No	
2. Multidosing leaflet	Yes / No	
Check Inhaler technique and type(s) of device(s)	Yes / No Good / Poor	Type(s) of device(s)

FOLLOW-UP

Self Management Plan given to discuss with GP (A&E)	Yes / No	
OR Self Management Plan completed (SSW/A&E) & given	Yes / No	
Copy of Self Management Plan to GP & Casenotes	Yes / No	
Review GP / OPD (Consider GP in 1 wk / or OPD 1 – 2 months)	Yes / No	
Referral to Respiratory Nurse	Yes / No	
Referral to CCN	Yes / No	
Referral to Practice Nurse	Yes / No	

DOCUMENTS

Document admission in Asthma Register	Yes / No	
Standard Hospital Discharge Prescription written (SSW)	Yes / No	
Check Discharge Prescription x 2 trained nurses	Yes / No	
Discharge medication given	Yes / No	
Immediate Letter (SSW)	Yes / No	
GP letter (A&E)	Yes / No	

Nurse (Print Name): ______________________ Signature: ______________________

Date: ______________ Time: ______________

DISCHARGE STATUS

A&E	Home ☐	SSW ☐	Other ☐	Please specify ______________
SSW	Home ☐	Admit Ward ☐	Other ☐	Please specify ______________

NHS Greater Glasgow and Clyde

Author: Heather Wallace (2003), SSN Paediatrics on behalf of the Documentation Sub Group, Children's Asthma Redesign Project
updated June 2007

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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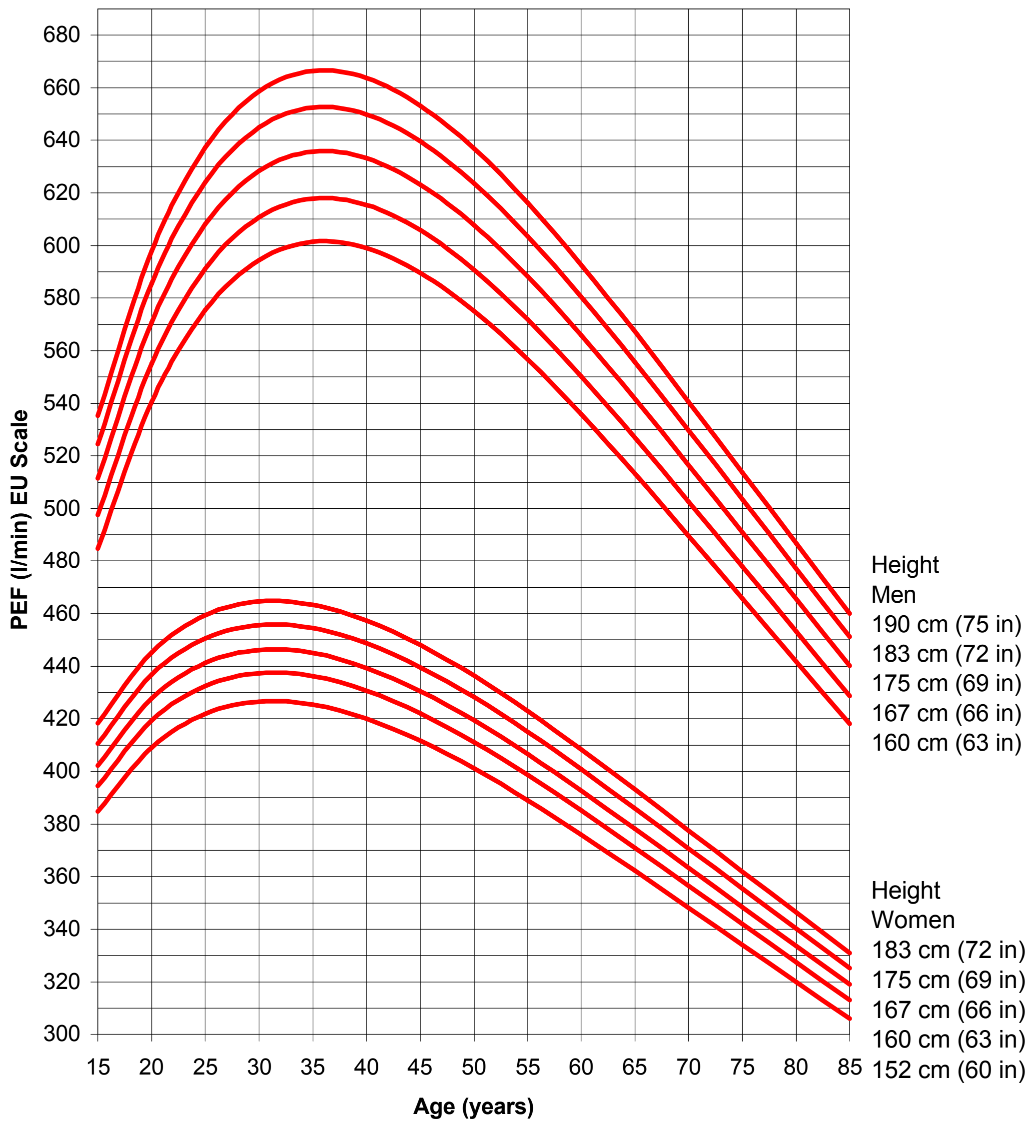
Annex 10



Adapted by Clement Clarke for use with EN13826 / EU scale peak flow meters
from Nunn AJ Gregg I, Br Med J 1989:298;1068-70