Emergency Department <2yrs: Senior input required

Management of acute asthma in infants aged <2 years in hospital[1]

ASSESS AND RECORD ASTHMA SEVERITY

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

Moderate asthma

- SpO_2 ≥92%
- Audible wheezing
- Using accessory muscles
- Still feeding

Acute severe asthma

- SpO_2 <92%
- Cyanosis
- Marked respiratory distress
- Too breathless to feed

Most infants are audibly wheezy with intercostal recession but not distressed

Life-threatening features include apnoea, bradycardia and poor respiratory effort

First-line treatments

Immediate management

Oxygen via close-fitting face mask or nasal prongs to achieve normal saturations

Give trial of β_2 agonist: salbutamol up to 10 puffs via spacer (given one puff at a time inhaled separately using tidal breathing) and face mask or nebulised salbutamol 2.5 mg

Repeat β_2 agonist every 1–4 hours if responding

If poor response:

Add 0.25 mg nebulised ipratropium bromide to each β_2 agonist nebuliser every 20–30 minutes for 1–2 hours

Consider: Oral prednisolone 10 mg daily for up to 3 days

Monitoring

Continuous close monitoring of:

- heart rate
- pulse rate
- pulse oximetry

Supportive nursing care with adequate hydration
Consider the need for a chest X-ray

Second-line treatments

- If not responding or has any life-threatening features, discuss with senior paediatriican or PICU team
- Consider alternative diagnoses
- Consider second-line treatments as per **Childrens Guides** with extreme caution

[1] Management of acute asthma in children under 1 year should be under the direction of a respiratory paediatrician.

Emergency Department 2 - 5 years

Age 2–5 years

ASSESS AND RECORD ASTHMA SEVERITY

Moderate asthma

- SpO_2 ≥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

Acute severe asthma

- SpO_2 <92%
- Too breathless to talk or eat
- Heart rate >140/min
- Respiratory rate >40/min
- Use of accessory neck muscles

Life-threatening asthma

SpO_2 <92% plus any of:

- Silent chest
- Poor respiratory effort
- Agitation
- Confusion
- Cyanosis

First line treatments

Moderate asthma:

- 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 oral prednisolone 20 mg

Reassess within 1 hour

Acute severe and life-threatening asthma: Oxygen via face mask/nasal prongs to achieve SpO_2 94–98%

Acute severe asthma:

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

Life-threatening asthma:

- Nebulised β_2 agonist: salbutamol 2.5 mg **plus** ipratropium bromide 0.25 mg nebulised
- Repeat bronchodilators every 20–30 minutes
- Oral prednisolone 20 mg or IV Hydrocortisone 4 mg/kg if vomiting

Discuss with senior clinician, PICU team or paediatrician

Second line treatments

- Consider 2nd line treatments - see **Page 2**
- Admit all cases if features of severe attack persist after initial treatment
- Arrange transfer to PICU/HDU if poor response to treatment as per local guidelines

DISCHARGE PLAN

- Continue β_2 agonist 4 hourly as necessary
- Consider prednisolone 20 mg daily for 3–5 days until symptoms have settled
- 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 within 48 hours
- Arrange hospital asthma clinic follow up in 4–6 weeks if 2nd or subsequent attack in past 12 months.

Hospital/Ongoing 2 - 5 years

Moderate asthma

- SpO_2 ≥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

Acute severe asthma

- SpO_2 <92%
- Too breathless to talk or eat
- Heart rate >140/min
- Respiratory rate >40/min
- Use of accessory neck muscles

Life-threatening asthma

SpO_2 <92% plus any of:

- Silent chest
- Poor respiratory effort
- Agitation
- Confusion
- 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 oral prednisolone 20 mg

Reassess within 1 hour

Oxygen via face mask/nasal prongs to achieveSpO$_2$ 94–98%

Acute severe asthma – treatment

- β_2 agonist 10 puffs via spacer ± facemask or nebulised salbutamol 2.5 mg
- Oral prednisolone 20 mg or IV hydrocortisone 4 mg/kg if vomiting
- Repeat β_2 agonist up to every 20–30 minutes according to response
- **If poor response** add 0.25 mg nebulised ipratropium bromide to every nebulised β_2 agonist every 20 minutes for 1–2 hours

Life-threatening asthma – treatment

- Nebulised β_2 agonist: salbutamol 2.5 mg **plus** ipratropium bromide 0.25 mg nebulised
- Repeat bronchodilators every 20–30 minutes
- Oral prednisolone 20mg or IV hydrocortisone 4mg/kg if vomiting
- **Consider adding 150 mg $MgSO_4$ to each β_2 agonist/ ipratropium nebuliser in first hour**

Discuss with senior clinician, PICU team or paediatrician

ASSESS RESPONSE TO TREATMENT
Record respiratory rate, heart rate and oxygen saturation every 1-4 hours

RESPONDING

- Continue bronchodilators 1–4 hours as necessary
- Discharge when stable on 4–hourly treatment
- Consider prednisolone 20 mg daily for 3–5 days or until symptoms have settled

At discharge

- Ensure stable on 4-hourly inhaled treatment
- Review the need for regular treatment and the use of inhaled steroids
- Review inhaler technique
- Provide a written asthma action plan for treating future attacks
- Arrange GP follow up within 48 hours
- Arrange hospital asthma clinic follow up in 4–6 weeks

Second-line treatments

NOT RESPONDING

- **Continue 20–30 minute nebulisers**
- **Consider chest X-ray and blood gases**
- **Discuss with senior clinician, paediatrician or PICU**
- **Consider admission to HDU/PICU**

Consider risks and benefits of:

- **Bolus IV infusion of magnesium sulphate 40 mg/kg (max 2g) over 20 minutes**
- **Bolus IV salbutamol** 15 micrograms/kg if not already given
- Continuous **IV salbutamol infusion** 1–5 micrograms/kg/min (200 micrograms/ml solution)
- **IV aminophylline** 5 mg/kg loading dose over 20 minutes (omit in those receiving oral theophyllines) **followed by** continuous infusion 1mg/kg/hour

Assess response before initiating each new treatment

Emergency Department 5 - 16 years

Moderate asthma

- SpO_2 ≥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

Acute severe asthma

- SpO_2 <92%
- PEF 33–50% best or predicted
- Heart rate >125/min
- Respiratory rate >30/min
- Use of accessory neck

Life-threatening asthma

SpO_2 <92% plus any of:

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

First line treatments

Moderate asthma:

- 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

Acute severe and life-threatening asthma:

Oxygen via face mask/nasal prongs to achieve SpO_2 94–98%

Acute severe asthma:

- 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 to every nebulised β_2 agonist
- Repeat β_2 agonist and ipratropium up to every 20 minutes for 2 hours according to response

Life-threatening asthma:

- Nebulised β_2 agonist: salbutamol 5 mg plus ipratropium bromide 0.25 mg nebulised
- Repeat bronchodilators every 20–30 minutes
- Oral prednisolone 30–40 mg or IV Hydrocortisone 4 mg/kg if vomiting

Discuss with senior clinician, PICU team or paediatrician

Second line treatments

- Consider 2nd line treatments - see **Page 2**
- Admit all cases if features of severe attack persist after initial treatment
- Arrange transfer to PICU/HDU if poor response to treatment as per local guidelines

DISCHARGE PLAN

- Continue β_2 agonist 4 hourly as necessary
- Consider prednisolone 30–40 mg daily for 3–5 days until symptoms have settled
- 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 within 48 hours
- Arrange hospital asthma clinic follow up in 4–6 weeks if 2nd or subsequent attack in past 12 months.

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

Hospital/Ongoing 5 - 16 years

ASSESS AND RECORD ASTHMA SEVERITY

Moderate asthma	Acute severe asthma	Life-threatening asthma
• SpO_2 ≥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**	• SpO_2 <92% • PEF 33–50% best or predicted • Heart rate >125/min • Respiratory rate >30/min • Use of accessory neck muscles	SpO_2 <92% plus any of: • PEF <33% best or predicted • Silent chest • Poor respiratory effort • Confusion • Cyanosis
• 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	Oxygen via face mask/nasal prongs to achieve SpO_2 94–98%	
	• 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 • Repeat β_2 agonist and ipratropium up to every 20–30 minutes according to response • **If poor response** add 0.25 mg nebulised ipratropium bromide to every nebulised β_2 agonist every 20 minutes for 1–2 hours	• Nebulised β_2 agonist: salbutamol 5 mg **plus** ipratropium bromide 0.25 mg nebulised • Repeat bronchodilators every 20–30 minutes • Oral prednisolone 30–40 mg or IV hydrocortisone 4mg/kg if vomiting • **Consider adding 150 mg $MgSo_4$ to each β_2 agonist/ ipratropium nebuliser in first hour** **Discuss with senior clinician, PICU team or paediatrician**
Reassess within 1 hour		

ASSESS RESPONSE TO TREATMENT
Record respiratory rate, heart rate, oxygen saturation and PEF/FEV every 1-4 hours

Second-line treatments

RESPONDING

- Continue bronchodilators 1–4 hours as necessary
- Discharge when stable on 4-hourly treatment
- Consider prednisolone 30–40 mg daily for 3–5 days or until symptoms have settled

At discharge

- Ensure stable on 4–hourly inhaled treatment
- Review the need for regular treatment and the use of inhaled steroids
- Review inhaler technique
- Provide a written asthma action plan for treating future attacks
- Arrange GP follow up within 48 hours
- Arrange hospital asthma clinic follow up in 4–6 weeks

NOT RESPONDING

- **Continue 20–30 minute nebulisers**
- **Consider chest X-ray and blood gases**
- **Discuss with senior clinician, paediatrician or PICU**
- **Consider admission to HDU/PICU**

Consider risks and benefits of:

- **Bolus IV infusion of magnesium sulphate 40 mg/kg (max 2g) over 20 minutes**
- **Bolus IV salbutamol** 15 micrograms/kg if not already given
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- **IV aminophylline** 5 mg/kg loading dose over 20 minutes (omit in those receiving oral theophyllines) **followed by** continuous infusion 1mg/kg/hour

Assess response before initiating each new treatment

Asthma/Wheeze Discharge Sheet
This is your discharge advice for the next week

Patients Name………………………………………………………………………… Admission PEFR…………………………….

Discharge PEFR…………………………….

Please make an appointment with YOUR GP/Practice Nurse/Asthma Nurse within 48hrs

You have been prescribed …………mg Prednisolone for ………….days, please take in the morning

If you use Brown/Orange/Purple inhalers continue to use twice a day even when well

How much of you Salbutamol (Blue inhaler) to use

Day	No. Puffs Blue Inhaler	Frequency
1	6 Puffs	Every 4 hours
2	4 Puffs	Every 4 hours
3	2 Puffs	Every 4 hours
4+	2-6 Puffs	As Needed

If symptoms worsen go back to previous days regime

You can use extra Blue inhaler if needed – Use 4 puffs and then 1 puff per minute until symptoms settle [If you need more than 10 puffs return to the Emergency Department, continue using Blue inhaler until you settle/help arrives].

Inhaler technique checked by Name………………………………………………………………

Sign………………………………………………………………….

When to return?

Emergency Department/999
Blue Inhaler not helping, Breathing is hard and fast, Can't talk or walk properly, Getting Tired

GP Today
You are using more Blue inhaler than suggested and/or you are concerned

GP/Practice Nurse/Children's Community Nursing Team
Your using the management plan but have some concerns

Remember ANYONE SMOKING in the household will worsen Your Asthma!!