

# Management of Acute Asthma and Wheeze in Children aged >2 years old

## ASSESS SEVERITY

### Moderate

- SpO<sub>2</sub> ≥ 92%
- Able to talk in sentences
- 2-5 years HR <140, RR <40
- ≥ 5 years HR <125 bpm, RR <30

### Immediate treatment

- **Oxygen** if SpO<sub>2</sub> <94%
- **Immediate steroid**  
PO Prednisolone 20-40mg
- **Salbutamol**  
6-10 puffs via MDI + spacer

Omit Prednisolone in children age < 3 years with mild viral associated wheeze

### Severe

- SpO<sub>2</sub> <92%
- Too breathless to talk/eat
- 2-5 years HR >140 bpm, RR >40
- ≥ 5 years HR >125 bpm, RR >30

### Life threatening

- SpO<sub>2</sub> <92%
- Silent chest
- Poor respiratory effort/ exhausted
- Agitation/ Reduced GCS
- Cyanosis

Get SENIOR HELP & ADVICE

### Immediate treatment

- **Oxygen** to maintain normal SpO<sub>2</sub>
- **Immediate steroid:** PO Prednisolone 20-40mg or IV Hydrocortisone 4mg/kg
- **Inhaled therapy:** Both treatments together in 3 back to back nebulisers
  - Nebulised Salbutamol (2.5mg if <5 years old, 5mg if ≥5 years old)
  - Nebulised Ipratropium bromide (250mcg)

continue on one hourly salbutamol nebulisers

ASSESS RESPONSE TO IMMEDIATE TREATMENT

### Responding to treatment

- **Salbutamol**  
Administer via nebuliser or MDI + spacer one to four hourly as needed

### Consider escalation

- If needing hourly nebulisers at 4 hrs
- Give Prednisolone if not given earlier
- Move to IV treatments

4 HOUR ASSESSMENT

### Escalation to IV bolus therapy

START ECG monitoring

- First line:  
**IV Salbutamol bolus**  
15mcg/kg (max 250mcg; > 2 years old) bolus over 10 min

Consider **IV Magnesium Sulphate bolus** 40mg/kg (max 2g; >2 years old) over 20 min, as an adjunct to IV bronchodilator therapy. DO NOT delay escalation to IV infusion therapy

### Immediate escalation to IV infusion therapy

- If inadequate response to IV bolus therapy
- If still requiring one hourly nebulisers at 4 hours

### Discharge

- Consider discharge when stable on 4 hourly treatment
- Prescribe Prednisolone for 3-5 days

### Discharge Care Bundle

- Provide/update **Asthma Action Plan**
- Review inhaler technique
- Check correct spacer is used
- Address asthma triggers
- Address parental smoking
- Advise GP follow up in next 48 hrs
- Arrange secondary care follow up in the next 1-2 months for children with asthma admitted to hospital or after 2 ER attendances

### IV infusion therapy

#### IV Aminophylline infusion

5mg/kg loading dose (max 500mg) over 20 min then continuous infusion at 1mg/kg/hour (age 2-12 years) or 0.5mg/kg/hour (age >12 years) (omit loading dose if on maintenance theophylline)

#### IV Salbutamol infusion

1-2mcg/kg/min as continuous infusion

Beware salbutamol toxicity:

- Tachycardia, metabolic acidosis, hypokalaemia
- Child must be on PICU to receive >2mcg/kg/minute IV Salbutamol

- Discuss patient with senior Paediatrician and PICU
- Identify where patient should be cared for - Ward/HDU/PICU
- Reduce frequency of inhaled bronchodilators to reduce side effects
- Consider CXR and blood gas

# Drug Monograph



## Oral Prednisolone

- Oral prednisolone should be given to all children with an exacerbation of asthma as soon as possible.
- In children with pre-school wheeze there are a subgroup who respond to prednisolone and a subgroup who do not. It is difficult to identify who will respond to prednisolone from the history and presenting symptoms.
  - Children of any age with atopy, or with recurrent wheeze that has responded to salbutamol and prednisolone in the past should be given steroids during an acute exacerbation.
  - Children age > 3 years are more likely to respond to steroids and should be given prednisolone during an acute exacerbation of wheeze.
  - Children aged < 3 years with viral associated wheeze should not routinely be given prednisolone for mild symptoms when presenting to primary care, A/E or PAU. If this group are admitted to hospital with more serious symptoms or require hourly salbutamol therapy for more than 4 hours, then they too should receive prednisolone therapy.
- Prednisolone is often vomited by younger children. This can be minimised by giving the prednisolone immediately, and before multiple salbutamol nebulisers have been administered, and by using an age appropriate preparation such as prednisolone oral solution.

### Dose:

Prednisolone 1-2mg/Kg (max 40mg) once daily for 3-5 days

### Preparations:

Prednisolone sugar free oral solution

Prednisolone 5mg tablets: can be given whole. If unable to take whole, tablets can be crushed and sprinkled on soft food, or mixed with water/squash (unlicensed). Taste is unpleasant so mixing with food is preferable.

## Hydrocortisone IV

- Give IV hydrocortisone if child has vomited prednisolone or is deteriorating.

**Dose:** 4mg/kg (max 100mg) every 6 hours, until conversion to oral prednisolone is possible.

**Administration:** Can be given undiluted over at least 1 minute, or diluted as necessary.

## Salbutamol IV bolus

- This stand alone IV bolus treatment is designed to open up the airways and help nebulised medication work. It is a single treatment, distinct from a salbutamol infusion and may be useful in children with moderate asthma who are unlikely to need escalation to infusion therapy.
- In children with a severe exacerbation it may or may not be given, but escalation to definitive IV infusion should not be delayed.

**Dose:** Child > 2years : 15 micrograms/kg (max 250 micrograms)

**Preparation:** Salbutamol 500 micrograms/ml solution for injection

**Administration:** Dilute 500 micrograms of salbutamol (1 vial of 500 microgram in 1ml strength) with 9ml sodium chloride 0.9% to give a solution of 500 micrograms in 10ml (50 microgram/ml). Administer the required dose as a slow bolus over 10 minutes.

## IV Magnesium Sulphate bolus

- There is little evidence for the use of IV magnesium in children. However it probably has a valuable effect in a subgroup of patients. It is easy and quick to prepare and can be used as an adjunct to IV bronchodilator therapy. However it should not delay escalation to IV infusion therapy in those with a severe exacerbation.

**Dose:** Child > 2 years: 40mg/Kg (max 2g) over 20 minutes

**Preparation:** Magnesium sulphate 50% injection (5g in 10ml)

**Administration:** Dilute 2g of magnesium sulphate (4ml of magnesium sulphate 50% injection solution) with 16ml sodium chloride 0.9% to give a solution 2g in 20ml (100mg/ml) Infuse 40 mg/kg (0.4 mls/kg) via a syringe driver over 20 minutes (but can be given as a slow push in life-threatening asthma)

Maximum dose is 2 grams or 20 mls of the 100 mg/ml solution

Ensure that ECG and oxygen saturation monitoring are in place

## IV Aminophylline - Loading dose and infusion

- For children who have received a lot of nebulised salbutamol, IV aminophylline should be considered as first line choice for IV infusion.
- All children requiring IV aminophylline should be reviewed by an experienced doctor
- Patients should receive continuous ECG monitoring to ensure any arrhythmias are detected, and should also have oxygen saturation monitoring in place

**Dose & administration:** Dilute 500mg of IV aminophylline (2 vials of the 250 mg in 10 ml strength) with 480 mls 0.9% sodium chloride to give a solution of 500mg in 500ml (1 mg/ml).

**Loading dose:** (omit loading dose if on oral theophylline)

5 mg/kg (5 ml/kg) over 20 minutes (If weight over 66 kg then loading dose should be given over 30 minutes)

Maximum dose is 500 mg (500ml)

*It is important to ensure that a volume limit is set on the infusion pump so that no more than the 5 mg/kg bolus is given before changing to the continuous infusion*

### IV Infusion:

Children aged 2-12 years: 1 mg/kg/hour (1 ml/kg/hour)

Children over 12 years: 0.5-1 mg/kg/hour (0.5-1ml/kg/hour)

## Intravenous Salbutamol Infusion - There is no loading dose to this therapy

- All children requiring IV salbutamol should be reviewed by an experienced doctor
- Patients should receive continuous ECG monitoring to ensure any arrhythmias are detected, and should also have oxygen saturation monitoring in place
- IV salbutamol may cause hypokalaemia therefore measure electrolytes twice daily
- IV salbutamol is not Y-site compatible with IV aminophylline.
- IV salbutamol is Y-site compatible with potassium infusions, only if mixed with sodium chloride 0.9%
- Once made, infusion bags are stable for 24 hours
- Inform both PICU and the hospital outreach team
- For patients with central access see the PICU asthma guideline

**Dose:** 1-2 microgram/Kg/min as continuous infusion

**Preparation:** Salbutamol 5mg/5ml solution for infusion

### Administration:

*Children under 40 kg*

Dilute 10 mg of intravenous salbutamol (2 vials of the 5 mg in 5 ml strength) with 40 mls of 0.9% sodium chloride to give a solution of 10 mg in 50 mls (200 microgram/ml)

*Children over 40 Kg*

Dilute 100 mg of intravenous salbutamol (20 vials of the 5mg in 5 ml strength) with 400 mls of 0.9% sodium chloride to give a solution of 100 mg in 500 mls (200 microgram/ml)

### IV Infusion:

Run the infusion rate at 1 -2 micrograms/kg/minute (0.3-0.6 ml/kg/hour).

*PICU admission should be considered in any child requiring an infusion of >1microgram/kg/minute.*

Beware Salbutamol toxicity: tachycardia, tachypnoea, metabolic acidosis (lactate commonly high) & hypokalaemia can occur with both IV and inhaled therapy.

**Please see Medusa IV guide for up to date administration advice.**