A Clinical Guideline for the use of intravenous Salbutamol in Acute Severe Asthma in Children

For use in:	Paediatric High Dependency Unit or Intensive Care
By:	Medical and Nursing Staff
For:	Children with Acute Life-Threatening Asthma
Division responsible for document:	Women and Children's Services
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Name and job title of document author's:	Dr Imogen Rose, Paediatric Specialist Registrar Dr Caroline Kavanagh, Consultant Respiratory Paediatrician
Name and job title of document author's Line Manager:	Bina Mukhtyar, Consultant Paediatrician
Supported by:	Children's Critical Care Group Regional High Dependency and Critical Care Forum
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If Yes - does the strategy/policy deviate from the recommendations of NICE? If so why?	No deviation

This guideline has been approved by the Trust's Clinical Guidelines Assessment Panel as an aid to the diagnosis and management of relevant patients and clinical circumstances. Not every patient or situation fits neatly into a standard guideline scenario and the guideline must be interpreted and applied in practice in the light of prevailing clinical circumstances, the diagnostic and treatment options available and the professional judgement, knowledge and expertise of relevant clinicians. It is advised that the rationale for any departure from relevant guidance should be documented in the patient's case notes.

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Version and Document Control:

Version Number	Date of Update	Change Description	Author
1.1	23/04/202	Reviewed with no clinical changes, as the	Dr I. Rose and

	0	drugs mentioned in document are specific, and unlikely to change.	Dr C Kavanagh

This is a Controlled Document

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Quick reference

Escalation of Care for Acute Severe or Life-Threatening Asthma

A Clinical Guideline for the use of intravenous Salbutamol in Acute Severe Asthma in Children

Objective

- To ensure the safe use of intravenous salbutamol in either the High Dependency Unit or Intensive Care Unit for children with acute severe or life threatening asthma.
- To provide appropriate instruction for the preparation of intravenous salbutamol solutions.
- To highlight problems with intravenous salbutamol use and suggest solutions if problems arise.

Broad recommendations

- Intravenous salbutamol should only be used if indicated, which will be informed by the patient's clinical condition. It can be used in patients with acute severe asthma or life-threatening asthma.
- Patients receiving intravenous salbutamol should be nursed in either a high dependency unit or an intensive care unit.
- Patients receiving intravenous salbutamol have continuous ECG monitoring and regular monitoring of blood potassium and blood gases.

Background

Salbutamol is a selective β_2 adrenoceptor agonist which acts on the β_2 adrenoceptors in the smooth wall of the bronchi causing bronchodilation. It is therefore used in the treatment and prevention of bronchospasm.

It provides relief of severe bronchospasm associated with asthma and for the treatment of status asthmaticus. It must be prescribed and monitored carefully.

It is usually initially administered in inhalation or nebulised form.

In cases of acute severe or life threatening asthma it can be given as an intravenous bolus and continued as an intravenous infusion. This must only occur in a high dependency unit or an intensive care unit.

If a patient is receiving intravenous salbutamol **and** intravenous aminophylline, then treatment in an intensive care unit is recommended.
This policy offers advice on intravenous salbutamol dosing and monitoring in patients with life threatening asthma.

Indications for Use

Intravenous Salbutamol should be prescribed in acute severe asthma unresponsive to nebulised bronchodilators and life threatening asthma (See flowchart on page 3).

The risk of toxicity increases with increasing infusion concentration.

Care should be taken in patients with hypertension, hyperthyroidism, myocardial insufficiency or diabetes.

Dosing of Salbutamol

Recommended dosing would be:

- An initial bolus of 5mcg/kg (birth-2 years) or 15mcg/kg (>2years) salbutamol (maximum 250mcg) over 15 minutes.
- This would be followed by an intravenous infusion of salbutamol at a dose rate of
    - 1-2mcg/kg/min.
- This salbutamol infusion can be increased to a maximum of 5mcg/kg/minute, but infusions at rates >2mcg/kg/min need discussion with PICU or CATS transport service.

Administration Details for Intravenous Salbutamol

Salbutamol for peripheral administration:

- Intravenous Salbutamol can be diluted with either 5% glucose or 0.9% sodium chloride solutions.
- Remove 100 mLs from a 500mL bag of 5% glucose or 0.9% sodium chloride solution.
- Add 100 mg salbutamol (1mg/mL ampoules) to this bag.
- This will create a 200microgram/mL solution
- The infusion rate 0.3mL/kg/hr= 1microgram/kg/minute

Salbutamol for central venous administration:

- Draw up 25mL (25milligram) of neat salbutamol 1mg/mL into a syringe
- The dose rate 1microgram/kg/min= (0.06 x weight in kg)mL/hr

Nurses should state on the drug chart the exact time of administration.

Administration of infusion should be via a syringe pump.

Set the volume to be infused on the syringe pump to prevent overdose.
The line must always be primed with the diluted salbutamol infusion to prevent any delay in the patient receiving the medication.

Monitoring of Intravenous Salbutamol

1. Patient needs to be nursed in a High Dependency unit or Intensive Care Unit.
2. Continuous cardiac ECG monitoring is needed.
3. Initial observations every 5 minutes for the first 10 minutes (pulse, respiratory rate, BP, oxygen saturation).
4. Observations every 15 minutes thereafter.

5. Minimum of 12 hourly U&Es to monitor potassium levels.
6. Adverse effects include: muscle tremors (especially the hands), tachycardia, nauseas and vomiting, headaches, agitation and hyperactivity, palpitations, feelings of warmth.
7. High doses can cause peripheral vasodilatation resulting in hypotension.
8. Overdose can result in chest pain, SVT and pulmonary hypertension.
    - Reduce infusion rate if develop lactic or metabolic acidosis, tachycardia, arrhythmias, tremor, severe hypokalaemia, hyperglycaemia or hypophosphatemia
    - If adverse effects arise, reduce the infusion initially, but if they persist consider changing to aminophylline

Discontinuing Intravenous Salbutamol Infusion

Criteria for reducing intravenous bronchodilator therapy:

- Normal respiratory effort
- Normal ability to speak
- Reduction in oxygen requirement

The elimination half-life of salbutamol is 4-6 hours

Reduce the intravenous salbutamol dose by 1mcg/kg/min every 6 hours.

Following cessation of infusion, salbutamol will be cleared within 48hours.

N.B. Substantial systemic absorption of salbutamol occurs via the GI tract when administered by inhalation so intravenous infusions should be discontinued before stopping nebulised/ inhaled salbutamol.

Patients should receive nebulised salbutamol every 2 hours and nebulised ipratropium every 4 hours whilst weaning off intravenous bronchodilators. Rebound bronchospasm can occur 24-48hours after stopping intravenous salbutamol, so patients need observed in hospital for this time period.

Clinical audit standards

- All children over the age of 2 years with acute severe or life threatening asthma should receive intravenous salbutamol initially as a bolus and then as an intravenous infusion if needed.
- Patients requiring intravenous salbutamol are nursed in a High Dependency unit or Intensive Care Unit
- Patients requiring intravenous salbutamol have continuous cardiac ECG monitoring.

- Patients requiring intravenous salbutamol have a minimum of 12 hourly U&Es to monitor potassium levels
- Medical notes should reflect review of the dosing regimen

Summary of development and consultation process undertaken before registration and dissemination

The authors listed above drafted this guideline on behalf of the regional High Dependency Care Forum and the Children's Critical Care Group who have agreed the final content. During its development, the guideline has been circulated for comment. Comments were addressed and incorporated if appropriate.

This version has been endorsed by the Clinical Guidelines Assessment Panel.

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