

Acute Severe Asthma

This guideline is for use by healthcare staff, at CoMET undertaking critical care retrieval, transport and stabilisation of children, and young adults.

CoMET is a Paediatric Critical Care Transport service and is hosted by the University Hospitals of Leicester NHS trust working in partnership with the Nottingham University Hospitals NHS Trust.

The guidance supports decision making by individual healthcare professionals and to make decisions in the best interest of the individual patient.

This guideline represents the view of CoMET, and is produced to be used mainly by healthcare staff working for CoMET, although, professionals, working in similar field will find it useful for easy reference at the bedside.

We are grateful to the many existing paediatric critical care transport services, whose advice and current guidelines have been referred to for preparing this document. Thank You.

| | |
|--|--|
| Executive Lead/ Medical Director: | Andrew Furlong (LRI, UHL – andrew.furlong@uhl-tr.nhs.uk) |
| Author: | Zoha Mohammad – Comet Consultant, UHL mohammad.zoha@uhl-tr.nhs.uk Adrian Low – Comet Registrar, UHL adrian.low@uhl-tr.nhs.uk |
| Guideline Lead: | Zoha Mohammad – Comet Consultant, UHL mohammad.zoha@uhl-tr.nhs.uk |
| Clinical Leads:- | Georgina Harlow – CoMET Head of Service Georgina.harlow@nuh.nhs.uk |
| Approved By: | UHL Policy & Guideline Committee |
| Date of Latest Approval: | 28 October 2023 |
| Version: | 2 |
| Next Review Date: | January 2027 |

Education and Training

1. Annual Transport team update training days
2. Workshops delivered in Regional Transport Study days/ Outreach

Monitoring Compliance

| What will be measured to monitor compliance | How will compliance be monitored | Monitoring Lead | Frequency | Reporting arrangements |
|---|----------------------------------|---|-----------|-------------------------------|
| Incident reporting | Review related Datix | Abi Hill – Lead Transport Nurse abi.hill@uhl-tr.nhs.uk | Monthly | CoMET Lead Governance Meeting |
| Documentation Compliance | Documentation Audit | Abi Hill – Lead Transport Nurse abi.hill@uhl-tr.nhs.uk | 3 Monthly | CoMET Lead Governance Meeting |

Acute Severe Asthma

Diagnosis of Acute Severe or Life-threatening Asthma (See appendix 1)

- Nebulised **Salbutamol** every 20 minutes and **Ipratropium** every 20 minutes for first 2 hours, then 4-6 hours as required (if delivering alongside high flow therapy, reduce flow)
- IV magnesium: **40mg/kg (max dose 2g)** 4-6 hourly
- IV hydrocortisone **4mg/kg** QDS (max 100mg) **OR** PO Dexamethasone **0.15mg/kg** QDS (max 4 mg)

- IV salbutamol bolus (**5mcg/kg**)
- Followed by IV infusion **0.5mcg/kg/min max** with ECG monitoring (Maximum 20mcg/min – do not exceed max adult dose)
- IV Aminophylline: **Discuss with Comet Consultant** (Bolus 5mg/kg (max 500mg), Infusion 1mg/kg/hr)
- IV 2/3 maintenance fluids

- **Oxygen**- aim saturations >92%
- Monitor for hypokalaemia/lactic acidosis/tachycardia
- CXR in life threatening or non-standard presentation

No improvement

Intubation indicated?
(See appendix 2)

No improvement

High Flow
2L/kg

No

NIV
CPAP: 7-8 cmH2O, SaO2 88-92%
(Choose appropriate interface)

No improvement

BIPAP
EPAP: 7-8 cmH2O
IPAP: 14-16 cmH2O
Ti 0.6 – 1s
Rate: Low end of normal

No

1. Increase IPAP &/or EPAP (aim for TV 6-8 ml/kg)
2. Check synchronisation/leaks

Within 2 hours
Assess success of NIV and consider intubation + **early Anaesthetist review** (See appendix 2)

Invasive ventilation
Contact CoMET via helpline

Intubation

- Ensure adequate help/support available
- Intubation by **most experienced** clinician
- Cuffed ET tubes preferable
- Use:
 - Ketamine (1-2mg/kg)
 - Rocuronium (1mg/kg)
- Manual decompression may help but there is an associated risk of cardiac arrest

- **Ventilation can get difficult after intubation**
- BP may drop if air trapping/dynamic hyperinflation (common)

Initial settings

Mode: Pressure controlled preferred
PIP: <30 cmH2O (Enough to move chest)
PEEP: 5
TV: 6-8 ml/kg
I:E ratio 1:3 to 1:5
Rate: 8-16 (Lower than normal for age)

Sedation

- Use Fentanyl and/or Ketamine for sedation

Tolerate high PCO2 (9-15 KPa)

(Blood PCO2 poorly correlates with ETCO2)

Refractory Hypoxaemia

- Reduce rate of ventilator breaths
- Reduce sedation doses
- Tolerate PIP Pressure 40-45

If no improvement, consider:

- Prone patient
- Manual decompression
- Increase serum Magnesium

Persisting hypercarbia

Check ETT patency
Exclude pneumothorax/leak around ET tube
Suction and/or physiotherapy may help remove mucous plugs

Consider referral for ECMO if ongoing refractory hypoxaemia
ECMO referral number 0300 300 3200

Appendix 1

| Acute severe | Life threatening |
|--|---|
| <ul style="list-style-type: none"> • SpO₂ <92% in air • Severe work of breathing with use of accessory muscles/ tachypnoea • Can't complete a sentence or unable to eat • Agitation • Tachycardia (Salbutamol also causes this) | <ul style="list-style-type: none"> • SpO₂ <92% in 15 litres oxygen • Silent chest, cyanosis or poor respiratory effort • Confusion or drowsiness • Increased PCO₂ or hypotension is a pre-terminal event • Consider history; alternative diagnosis (if 1st presentation) eg. foreign body / pneumothorax • Chest X-ray can be useful at this stage or as baseline |

Appendix 2

Mechanical ventilation in patients with acute severe/life-threatening asthma is a high-risk intubation. A decision to intubate and ventilate a patient is clinical and not based on blood gas analysis.

It should be discussed with the COMET consultant.

Indications for intubation

- Apnoea
- Severe respiratory acidosis
- Hypercarbia (CO₂ rising or arterial sample more than 6KPa)
- Severe hypoxia
- Deteriorating consciousness level and signs of fatigue

Aims of mechanical ventilation

- Maintain adequate oxygenation
- Minimise dynamic hyperinflation
- Avoid ventilation induced lung injury

References

1. STRS guidelines- march 2017
2. KIDS clinical guideline version august 2016,
3. British Thoracic Society Guidelines on Asthma. (2012 version)
4. UHL /LRI Asthma management guidelines –sept 2019.
5. NUH Acute Asthma PICU guidelines- 2023
6. Durward et al. Crit care med 2004
7. Tobin. Crit care resus 2005.
8. Dworkin G, Kattan M. Mechanical Ventilation for status asthmaticus in children. J Pediatr 1989; 114:545.
9. Carroll CL, Sala KA. Pediatric Status Asthmaticus. Crit Care Clin 29 (2013) 153-166.
10. Papiris S, Kotanidou A, Malagari K, Roussous C. Clinical review: Severe asthma. Critical Care. (2002) 6(1) 30-44.

| Version | Issue Date | Author(s) | Description |
|---------|--------------|-----------------------------|--|
| 2 | October 2023 | Mohammad Zoha Adrian Low | General formatting altered, inclusion of flowchart layout, dosing updated, Ipratropium bromide can be nebulised alongside salbutamol for first two hours |