

## Clinical Guideline

**WATCH – SEVERE ASTHMA IN CHILDREN**

<b>SETTING</b>	Wales and West Acute Transport for Children (WATCH)
<b>FOR STAFF</b>	WATCH Team, South West and Wales District General Hospital medical and nursing teams.
<b>PATIENTS</b>	Children with acute severe asthma who need high dependency or intensive care

---

## GUIDANCE

It should be noted that there are relatively few randomised controlled trials in the intensive care management of childhood asthma.

The National Review of Asthma Deaths (NRAD) reviewed all asthma deaths occurring in the UK between February 2012 and January 2013. There were 28 deaths of children and young people aged up to 18; 75% of these were before reaching hospital. Over half were viewed as potentially avoidable, often because of lack of recognition of the severity of the asthma. Paediatric intensive care unit (PICU) mortality is generally low, with deaths usually due to hypoxic brain injury secondary to out-of-hospital cardiac arrest preceding admission.

---

<b>GLOSSARY</b>	ETT Endotracheal tube PEEP Positive end expiratory pressure
<b>RELATED DOCUMENTS</b>	Asthma – Management in PICU WATCH Intubation checklist WATCH securing and management of endotracheal tubes British Guideline on the Management of Asthma <a href="https://www.brit-thoracic.org.uk/quality-improvement/guidelines/asthma/">https://www.brit-thoracic.org.uk/quality-improvement/guidelines/asthma/</a>
<b>AUTHORISING BODY</b>	WATCH governance group
<b>SAFETY</b>	Call the WATCH team for advice and support.
<b>QUERIES</b>	0300 0300 789

## SEVERE ASTHMA

INITIAL MANAGEMENT	INDICATIONS FOR INTUBATION
<p>Humidified Oxygen to keep saturations &gt; 95%</p> <p>ECG monitoring, ensure senior staff involved</p> <p>Nebulised salbutamol up to every 20 minutes for 1<sup>st</sup> hour (2.5mg ≤ 4 years, 2.5 - 5mg &gt;5 years)</p> <p>Ipratropium bromide 250 microgram given up to every 20 minutes mixed with salbutamol for the first hour, thereafter 4-6 hourly</p> <p>Hydrocortisone 4mg/kg (max 100mg) IV 6 hourly or oral Prednisolone 2mg/kg (max 60mg) daily</p>	<p>Saturations &lt;92% despite high flow/face mask O<sub>2</sub> after 1<sup>st</sup>/ 2<sup>nd</sup> line therapy</p> <p>Hypercarbia CO<sub>2</sub>&gt; 6kPa – rare in acute asthma = signs of fatigue</p> <p>Apnoeas, severe dyspnoea</p> <p>Poor air entry/ absent wheeze</p> <p>Reduced level of consciousness</p>
IF NO SIGNIFICANT IMPROVEMENT	HOW TO INTUBATE
<p>Consider alternate diagnosis e.g. anaphylaxis, pneumothorax, collapsed lobe, or inadequate drug delivery while preparing second line treatment. <b>CXR</b> may be helpful at this point.</p> <p><b>IM adrenaline (10microgram/kg) should be given if there is any suggestion of anaphylaxis</b></p>	<p><b>Intubation of a sick asthmatic is potentially hazardous, and ventilation is likely to be difficult. Seek senior anaesthetic support and telephone advice from WATCH. Use an intubation checklist.</b></p> <p>Pre-oxygenate (3 minutes) – consider PEEP via anaesthetic circuit if tolerated</p> <p>2 x large IV cannulae</p> <p><b>Preload with 10-20 mL/kg Plasma-Lyte</b></p> <p>Optimise patient position</p> <p>Ensure suction facilities available (yankauer and soft catheters)</p> <p>Appropriately sized cuffed oral ETT (do not cut)</p> <p>Dilute adrenaline (0.1mL/kg of 1:10,000 adrenaline made up to 10mL with 0.9% saline; 1mL = 1 microgram/kg) / fluid for resuscitation</p> <p>Ketamine 1-2 mg/kg, Fentanyl 1 microgram/kg, Rocuronium 1 mg/kg (Sevoflurane as alternative)</p>
SECOND LINE TREATMENTS	HOW TO VENTILATE
<p>See WATCH drug sheet – peripheral strength solutions</p> <p><b>Magnesium Sulphate</b></p> <p>Dose 40mg/kg IV (max 2g, dilute to 2g/20mL 0.9% NaCl) over 20 min (10 min in life-threatening asthma)</p> <p><b>AND</b></p> <p><b>Intravenous Salbutamol</b></p> <p>Loading dose at 5 microgram/kg/min for 1 hour (1.5mL/kg/h of 200 microgram/mL solution)</p> <p>Then reduce infusion rate to 1 microgram/kg/min (0.3 mL/kg/h). In exceptional circumstances higher infusion rates may be used but risk salbutamol toxicity.</p> <p><b>AND/OR</b></p> <p><b>Intravenous Aminophylline</b></p> <p>500mg to a total volume of 500mL 0.9% NaCl. Loading dose 5mg/kg over 20 minutes (max dose 500mg. If weight &gt;66kg loading dose over 30 mins. Maintenance 0.5-1mg/kg/h.</p> <p><b>Non-invasive ventilation</b> may be used – discuss with WATCH if this is considered</p>	<p>Accept hypercapnia but keep pH &gt; 7.2, saturations &gt;90%</p> <p>Aim Max Peak Inspiratory Pressure &lt; 35cm H<sub>2</sub>O</p> <p>Use long expiratory time to allow lung emptying (look at volume loops where possible)</p> <p>PEEP at least 5 cmH<sub>2</sub>O</p> <p>6-8mL/kg tidal volume</p>
COMMON PITFALLS	ONGOING MANAGEMENT
<p>Underestimation of severity and inadequate therapy</p> <p>Ventilation-perfusion mismatch caused by salbutamol (hypoxia despite reduced dyspnoea)</p> <p>High flow nasal oxygen reducing delivery of nebulised medication (turn flow down during nebulisers)</p> <p>Salbutamol toxicity (tachycardia, tachypnoea, metabolic (and lactic) acidosis despite improving oxygenation and air entry – may need trial of reduction of salbutamol</p> <p>Anaphylaxis (adrenaline IM (10microgram/kg) if any suspicion)</p> <p>Pneumothorax</p> <p>Cardiac arrest from hypovolaemia during intubation</p> <p>Aiming for normal blood gases in ventilated patients</p>	<p>CXR post intubation</p> <p>Sedate with Morphine/Midazolam IV infusions as first line, alternatives are Ketamine, Fentanyl, Propofol</p> <p>Ensure adequately muscle relaxed with a Rocuronium infusion</p> <p>Consider manual decompression for dynamic hyperinflation: disconnect from the ventilator, attach to anaesthetic bagging circuit with flow in 100% oxygen, ventilate and then compress the chest bilaterally during expiration</p>