Clinical Guidance

Paediatric Critical Care: Severe Bronchiolitis

Summary
This guideline is for those patients with severe bronchiolitis who are being considered for critical care, thus interventions like chest x-ray, bloods, fluid restriction and antibiotics are appropriate. For other patients please see the NICE guideline.

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This clinical guideline has been produced by the South Thames Retrieval Service (STRS) at Evelina London for nurses, doctors and ambulance staff to refer to in the emergency care of critically ill children.

This guideline represents the views of STRS and was produced after careful consideration of available evidence in conjunction with clinical expertise and experience. The guidance does not override the individual responsibility of healthcare professionals to make decisions appropriate to the circumstances of the individual patient.

Change History		
Date	Change details, since approval	Approved by
Aug 18	Reviewed, minor clarifications made. Milesi reference added Use of PCT (Procalcitonin) added as per ELCH PICU policy	ELGG

Paediatric Critical Care

Severe bronchiolitis

Bronchiolitis is a common viral respiratory condition associated with lower airway obstruction, air trapping and atelectasis. This guideline is for those patients with severe bronchiolitis who are being considered for critical care, thus interventions like chest x-ray (CXR), bloods, fluid restriction and antibiotics are appropriate. For other patients please see the NICE guideline.

Clinical presentation

- Fever, rhinitis and cough
- increased work of breathing, tachypnoea or wheeze
- Apnoeas (esp. <2 months)
- Cyanosis
- Poor feeding

Criteria for severe disease

- Saturations< 92% despite oxygen
- Respiratory rate > 70 breaths / minute
- Signs of severe respiratory distress
- Apnoea
- Decreased level of consciousness

Lower threshold in high risk group (see right)

High risk groups

- Prematurity and neonates
- Pre-existing respiratory condition
- Congenital heart disease (CHD)
- Neuromuscular conditions (may not have signs of distress)
- Immune deficiency

Baseline investigations

- Nasopharyngeal aspirate for respiratory viruses (RSV)
- Baseline CXR
- Full blood count with differential (pertussis-lymphocytosis)
- Electrolytes (including plasma sodium)
- Blood gases unhelpful in directing need for resp support

Management principles on ward / HDU

- Maintain oxygen saturations ≥90% unless congenital heart disease/CHD (seek advice)
- Apnoea monitoring if required (history, <2 months)
- Minimal handling
- Suction nasal secretions if obstructed with mucus
- Non-invasive respiratory support by humidified high flow nasal cannula at 2 L/kg/min or CPAP 5-6cm H_2O (CPAP offers better resp support). Reassess frequently.
- Small volume, frequent nasogastric feeds if possible
- Reduce enteric fluid intake to 50ml/kg/day (risk of fluid overload/hyponatraemia/seizures)
- If IV fluid required-must be isotonic (e.g. 0.9% sodium chloride with 5% glucose). Run at 50ml/kg/day.
- Antibiotics: Co–amoxiclav IV: treat empirically if referred for PICU (30-40% have bacterial isolates). Consider cefotaxime <1month or ceftriaxone >1month if CNS concerns (+/- aciclovir) or penicillin allergy*.

- No role for nebulised salbutamol, ipratropium bromide, adrenaline, hypertonic sodium chloride or steroids
- Respiratory stimulants (e.g. caffeine) have no role

Assessment for ventilatory support & PICU transfer

- Severe respiratory distress or risk of respiratory arrest
- Lack of clinical improvement or deterioration on non-invasive respiratory support
- O_2 requirement ≥60% to maintain saturations ≥90%
- Persistent or recurrent apnoeas
- Lack of improvement in level of consciousness
- Neuromuscular patients may not be able increase their work of breathing- consider gas in these patients
- Seizures

Intubation and ventilation

- **Optimise pre-oxygenation**
- Decompress stomach by nasogastric tube aspiration
- Consider volume bolus (10ml/kg) prior to anaesthesia
- Anticipate non-compliant chest once anaesthetised and muscle relaxed. Mask ventilate with slow respiratory rate (20-30) to achieve good chest movement
- Choose appropriate endotracheal tube(ETT) to minimise leak
- Ensure end tidal (ET)CO_2 monitoring available
- **Initial ventilation: I time 0.8s, RR 20-30, PEEP 5cm H_20, Enough PIP to move chest (ideally <30cm H_20)**
- Secure ETT (see guideline) and CXR
- Review chest and ventilation settings regularly
- Target oxygen saturations >92% unless CHD
- Target $ETCO_2$ 5-10KPa
- Sedate with morphine & muscle relax as required
- Suctioning of ETT may be helpful
- Arterial line not usually required for management

Troubleshooting difficulties on ventilator- DOPES

- **D**isplaced ETT-check $ETCO_2$ and exact length of tube
- **O**bstruction- suction ETT and check passes to end of ETT
- **P**neumothorax-clinical examination- can be difficult to exclude if chest hyper-expanded due to air trapping
- **E**quipment- check ventilator settings including O_2.
- **S**tomach- Ensure decompressed with nasogastric tube

Assess DOPES first, CXR if problem not resolved

Further management on PICU

- Bronchoalveolar lavage specimen for viral+bacterial culture
- White cell count, haemoglobin, electrolytes, CRP & PCT
- Continue antibiotics (see left) for 48hrs then review stopping or continue for 5 days. Enteral co-amoxiclav if no sepsis concerns. Consider gentamicin if high fever/WCC/CRP/PCT
- Consider further tests if recurrent resp. presentations

Outcome and discharge from PICU to ward

Mortality <1%. Underlying co-morbid group has highest risk

Length of ventilation, usually 3-7 days

- Oxygen requirement <2litres/min nasal cannula
- No apnoeas for 12 hours

*Consult microbiology if severe allergy (anaphylaxis: angioedema, airway swelling, hypotension)

References: *Bronchiolitis NICE guideline 2015; Hanna. Acta Paediatr. 2003; Kneyber. Int Care Med 2005; Lillie. PICS UK 2012; Cunningham. Lancet 2015; Milesi*