A Trust Guideline for the Management of

Bronchiolitis in Infants and Children Under the Age of 24 months

A Clinical Guideline Recommended

For use in:	Children's Assessment Unit (CAU), Buxton Ward, Children's Day Ward, Jenny Lind Out-patients Department, Accident and Emergency Department
By:	Medical and Nursing staff
For:	Children under 24 months with Acute Bronchiolitis
Division responsible for document:	Women and Children's Division
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Names and job titles of document authors:	Dr Kat Bohanan, Paediatric Consultant Dr Edward Broad, Paediatric Registrar
Name of document author's Line Manager:	Stephanie Pease
Job title of document author's Line Manager:	Head of Women's and Midwifery Services
Supported by:	Paediatric Medical Consultants and Nurses
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If Yes – does the Strategy policy deviate from the recommendations of NICE? If so, why?	No deviations

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.

The Trust's guidelines are made publicly available as part of the collective endeavor to continuously improve the quality of healthcare through sharing medical experience and knowledge. The Trust accepts no responsibility for any misunderstanding or misapplication of this document.

Version and Document Control:

Version Number	Date of Update	Change Description	Author
2	10/02/2022	Incorporates the new NICE guidance. Saturation cutoffs amended (<90% if >6 weeks, <92% if <6 weeks or high risk).	Dr Kat Bohanan, Dr Edward Broad

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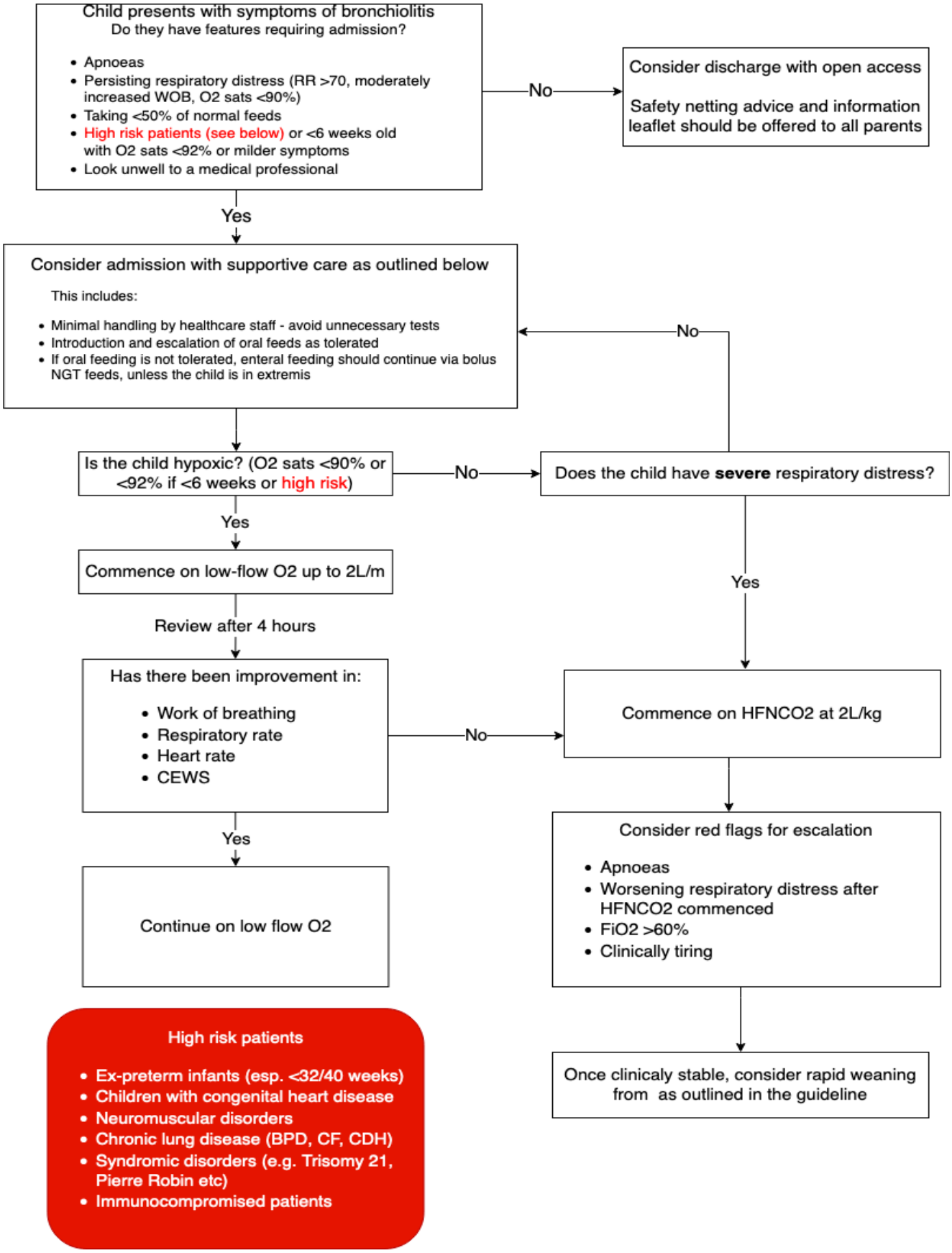
Quick Reference Guide



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Objective

A concise and uniform guideline to optimise the management of Bronchiolitis/probable Bronchiolitis in the Trust.

Rationale

Bronchiolitis is an acute infectious respiratory illness common in children under the age of two years, with a peak age of 3-6 months. It is prevalent between the months of November and March. It is usually a mild illness not necessitating admission. Only 3% of all under ones with bronchiolitis are hospitalised, although one third of all infants will develop bronchiolitis.

Aetiology

Bronchiolitis is mainly a clinical diagnosis. Respiratory Syncytial Virus (RSV) is the most common pathogen (70-80%). However other viruses such as metapneumovirus, parainfluenza, influenza, adenovirus, rhinovirus and bocavirus may cause the same clinical picture.

Clinical Presentation

Patients with bronchiolitis present with a 1-3 day coryzal prodrome, followed by increased work of breathing, cough, reduced feeding, and wheeze and scattered crackles on chest auscultation.

Symptoms usually peak between 3-5 days of the illness and the cough usually resolves in 90% of cases within 3 weeks.

Bronchiolitis results in airway plugging with sloughed epithelium, mucus and oedema, leading to hyperinflation, atelectasis, and impaired gas exchange. There is minimal/no bronchospasm in most patients with bronchiolitis, and as a result, short-acting bronchodilators are not useful in the treatment of acute bronchiolitis.

Diagnosis

Diagnosis can be made if the child has a coryzal prodrome lasting 1-3 days followed by persistent cough, tachypnoea and/or chest recession and crackles and/or wheeze on auscultation.

Fevers >38^{o}C occur in 30% of patients with bronchiolitis. High grade fever (>39 ^{o}C) is rare in bronchiolitis and alternative causes should be considered.

Young infants may present with apnoeas as the only feature of bronchiolitis. Infants may be hypoxic.

Differential Diagnosis

- Aspiration.
- Pertussis.
- Bacterial pneumonia – if high fever and focal chest signs

- Congestive heart failure/Myocarditis
- Viral induced wheeze / Early onset asthma in the older child.
- Structural abnormalities of airways (tracheo-oesophageal fistula etc.)
- Cystic fibrosis (CF).

High Risk Children

Several risk factors put children with bronchiolitis at increased risk of severe illness.

These include:

- Ex-preterm infants.
- Congenital heart disease.
- Neuromuscular disorders.
- Chronic lung disease (BPD, CF, Diaphragmatic hernia, CCAM etc.)
- Syndromic disorders (e.g. Trisomy 21, Pierre-Robin etc.)
- Immune deficiency.

Management

Admission

- The majority of patients with bronchiolitis do not require admission to hospital, and can be safely cared for at home.
- Consider admission to hospital in patients with the following:
  1. Apnoeas.
  2. Saturations persistently <90% in room air, or <92% in **high risk children.**
  3. Taking <50% of normal feed requirements.
  4. Persisting respiratory distress (e.g. marked chest recessions, grunting, RR >70bpm).
  5. Patients in a high risk group with milder symptoms, especially if earlier in the disease process.

Investigations

- CXR is unnecessary in uncomplicated bronchiolitis, as the radiological features often mimic LRTI, and risk unnecessary antibiotic prescription.
- Routine bloods are unnecessary, and will only serve to distress the child
- Routine blood gas testing is unnecessary, and should be reserved for specific circumstances:
  - Worsening respiratory distress (i.e. increasing FiO2 requirements to maintain saturations).

- Impending respiratory failure (frequent/recurrent apnoea, child appears listless and tiring).
    - Recent evidence suggests that significantly raised CO2 in bronchiolitis is unlikely in the absence of an oxygen requirement.

Drugs / Medication / Interventions

- Oxygen should be administered if saturations are persistently <90% in children over 6 weeks, and persistently <92% in children <6 weeks or with **high risk** features.
- Antibiotics should not be used in bronchiolitis unless there is a concomitant bacterial infection or a strong suspicion of one (e.g. significant fever >39C with focal chest signs).
- Oral or inhaled steroids should not be used in bronchiolitis, as there is no evidence that they are effective.
- Salbutamol should not be used in bronchiolitis. In an older child (>1 year), a trial of bronchodilators could be used, however, if they cause no improvement, and the clinical picture supports a diagnosis of bronchiolitis, these should be stopped.
- Ipratropium bromide should not be used in bronchiolitis.
- Nebulised adrenaline should not be used in bronchiolitis.
- Hypertonic sodium chloride is not currently recommended in the UK for use with bronchiolitis.
- Montelukast should not be used in bronchiolitis.
- Chest physiotherapy should not be used in bronchiolitis, unless the patient has a pre-existing condition leading to an inability to clear secretions properly (e.g. spinal muscular atrophy).

Respiratory support

- Patients presenting to the department with severe respiratory distress/ apnoeas/ exhaustion should be moved to HDU, and assessed as to whether commencing on CPAP is appropriate, or whether there is indication for intubation, ventilation and transfer to PICU.
- In patients presenting with more moderate symptoms, first line respiratory support for a child with oxygen requirements should be low-flow NCO2 to maintain oxygen saturations of >90% in children >6 weeks, or >92% in children <6 weeks or with **high risk** features, **even in the presence of increased work of breathing.**
- Recent large-scale studies have concluded that using HFNCO2 as an initial therapy is neither necessary, nor cost-efficient, as 70% of patients with increased work of breathing and O2 requirements will stabilize on low-flow O2 alone. It is, however, supported as rescue therapy for patients who do not respond to initial low-flow oxygen.
- In patients requiring supplementary O2 to maintain O2 saturations >90% in children >6 weeks or >92% in children <6 weeks or with **high risk** features, low flow O2 up to 2L/m should be commenced as first line.

- They should be reviewed after 4 hours, and if there is no improvement in their observations (RR, HR, CEWS score), they should be escalated to HFNCO2, with a starting flow of 2L/kg/min, and moved to HDU.
- Patients who fail to respond to HFNCO2 can be escalated to CPAP as per the NNUH CPAP Guideline.
- Patients requiring CPAP/HDU should be discussed with the on-call consultant, and if felt to be deteriorating, should be discussed with local anaesthetic team/paediatric anaesthetist on-call to assess the need for invasive ventilation.
- If a child needs invasive ventilation, and is <5kg, discuss with NICU registrar as to the suitability of admission to NICU as per HDU SOP.

Feeds/Fluids

- Oral feeding is the preferred mode of feeding in children with mild/moderate bronchiolitis.
- If oral feeding is not tolerated, NG bolus feeding is preferable to IV fluids.
- Those unable to tolerate oral feeding are at a higher risk of SIADH, and therefore NG/IV fluids should be restricted to 2/3rds maintenance rates.
- IV fluids may be used in severe bronchiolitis, who are unable to tolerate enteral feeding. It may also be appropriate to withhold feeds for a period of time whilst the infant is stabilising after admission, however, once they are stable, NG feeds can be resumed safely.
- Consider comfort feeds in patients that are NBM at 10-20ml/kg if they are unsettled.
- NG feeds are safe and well tolerated, even in children on HFNCO2, and the commencement/continuation of HFNCO2 is not an absolute contraindication to NG feeds.

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Rapid weaning of HFNCO2

- To avoid rapid deterioration or unnecessary continuation of HFNCO2, the Trust has adapted the RCPCH Guidance for rapid weaning of HFNCO2 in the ward-based setting. The following table outlines the process:

Sustained response to HFNCO2 **Nursing ratio 1:4 or 1:3 <2 years**	**Response to HFNCO2** **Nursing ratio 1:2 or 1:3 if cohort is ward level**	**Unresponsive to treatment**
Wean FiO2 to 0.3-0.4 (depending on patient)	Moderate respiratory distress continues and/or FiO2 > 0.4-0.6	In the first hour
THEN Halve the flow rate THEN If no clinical deterioration is seen after 4 hours, HFNCO2 can be discontinued (or as soon as 1 hour if paediatric consultant confirms) THEN Restart at weaning flow rate if stopping HFNCO2 is not tolerated	Reassess child's positioning, suitability of oral feeding, minimize handling, and continue on current HFNCO2 settings until ready to wean THEN Continue to observe for deterioration or any red flags	• Reassess child's positioning, suitability of oral vs IV hydration, and minimize handling. • Ensure paediatric consultant has been informed +/- review. • Discuss with CATS retrieval. • Discuss/review with anaesthetic registrar/paediatric anaesthetist on call. • Discuss with NICU team if baby weighing <5kg. • Closely observe for red flags*. After 2 hours or with any red flags: • Consider CPAP or invasive ventilation. • Prepare patient, team and family for intubation.

*** Red flags for immediate escalation**	**Immediate reaction**
• Any apnoeic/bradycardic episodes. • Significantly increasing respiratory distress after HFNCO2 commenced. • Clinically tiring. • Worsening CEWS score indicating escalation to medical team. • FiO2 > 0.6.	• Increase FiO2 to maximum. • Call medical team to attend/PET call if indicated. • Prepare for intubation. • Liaise with CATS/anaesthetic team/NICU if child <5kg. • Communicate with family.

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Clinical audit standards

- All children attending with a diagnosis of bronchiolitis has pulse oximetry undertaken.
- All children requiring CPAP/HDU admission must be discussed with the on-call consultant and if felt to be deteriorating, must be discussed with NICU/ITU/on-call paediatric anaesthetists.
- All families at discharge should be given Bronchiolitis advice leaflets.

Summary of development and consultation process undertaken before registration and dissemination

The guideline was drafted by Dr Kat Bohanan and Dr Edward Broad. It has been circulated to the Jenny Lind Children's Hospital (Acute Paediatrics and Neonatal Consultants, Specialist Registrars, Nursing staff on the Children's Assessment Unit and Buxton Ward), Accident and Emergency Consultants and Paediatric Anaesthetists for comments.

Distribution list / dissemination method

To CAU, Paediatric Wards, A&E and the above Departments, and on the Intranet.

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Glossary of terms

ADH	Anti-diuretic Hormone	BLS	Basic Life Support
BPD	Bronchopulmonary Dysplasia	CEWS	Children's Early Warning Scores
CATS	Children's Acute Transport Service	CF	Cystic Fibrosis
CCAM	Congenital Cystadenomatoid Malformation	CPAP	Continuous Positive Airway Pressure
HFNCO2	High flow nasal cannula oxygen	NPA	Nasopharyngeal Aspirate
NGT	Naso-Gastric Tube	OGT	Orogastric Tube