LRI Emergency Department and Children's Hospital

Bronchiolitis

Staff relevant to:	Medical and Nursing staff working with Infants and Children presenting with Bronchiolitis within the UHL Children's Hospital and Emergency Department
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1. Introduction and who this guideline applies to

Bronchiolitis is a viral infection of the respiratory tract. It is most commonly seen in infants,usually between 3 and 6 months of age but can present in children up to one year.

Typical history is of a coryzal illness worsening between 3 and 5 days associated with cough,difficulty in breathing and reduced feeding. Young babies can present solely with apnoea. Examination may reveal tachypnoea, signs of respiratory distress (e.g. tracheal tug, grunting, subcostal recessions), hypoxia and wheeze and/or crackles on auscultation.

The management of bronchiolitis is supportive and involves feeding and respiratory support as appropriate.

This guideline is intended for use by Medical and Nursing staff working with Infants and Children presenting with Bronchiolitis within the UHL Children's Hospital and Emergency Department.

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Key points

•DO :

- Give oxygen to maintain SpO_2 >90 or 92% (see later text)
- Ensure hydration. Fluids may need to be via nasogastric or orogastric tube if the baby cannot take enough by mouth
- Give families information on Bronchiolitis and its supportive management, including red flag features to look for.

•DO NOT ROUTINELY:

- Perform CXR. Radiographic changes mimic pneumonia and should not be used to determine need for antibiotics.
- Perform blood tests, including blood gases.

•DO NOT GIVE:

- Antibiotics
- Hypertonic saline
- Nebulised adrenaline
- Salbutamol
- Montelukast
- Ipratropium bromide

Acute Management

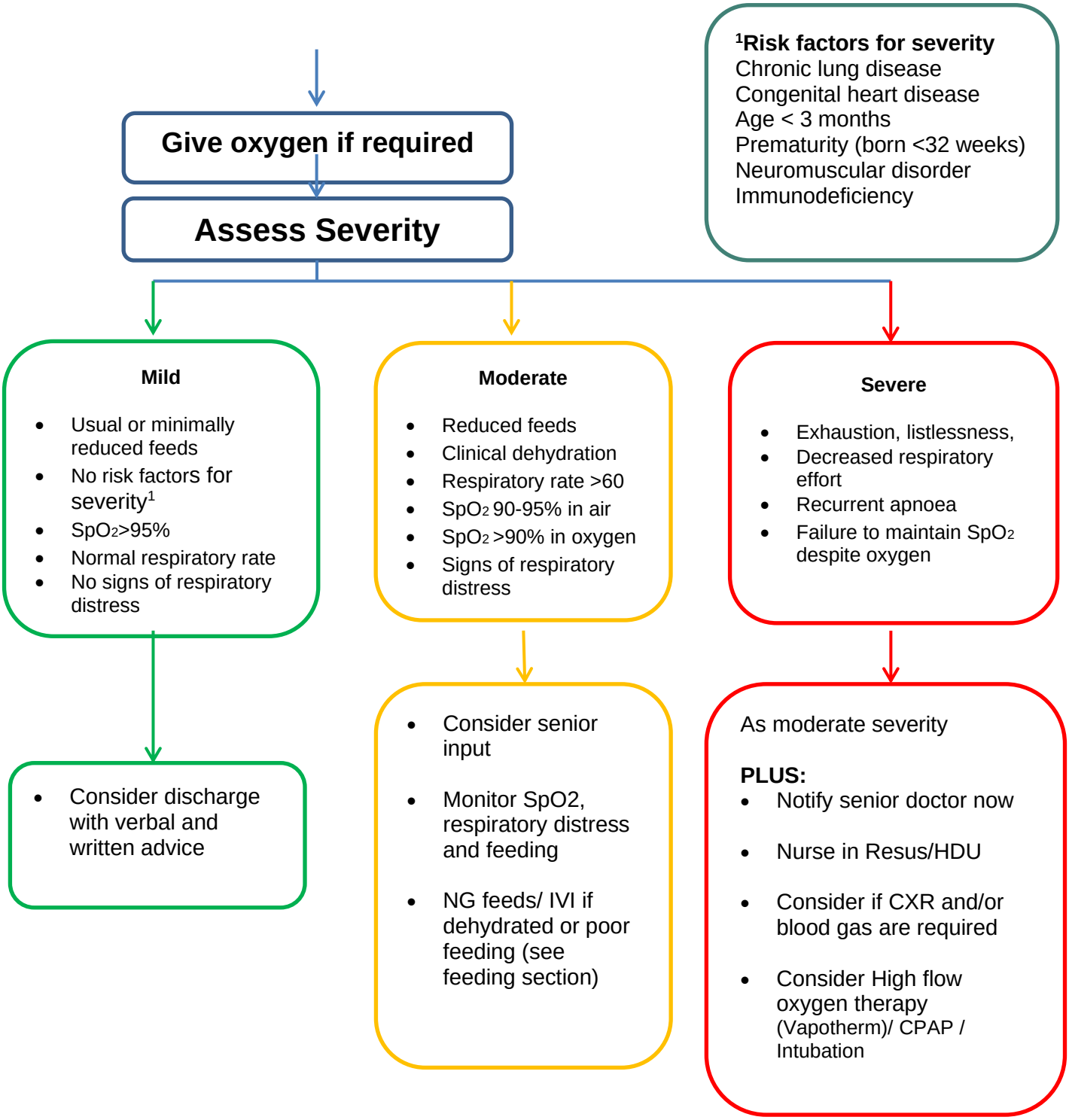
Is this Bronchiolitis?

•Coryzal prodrome **and**

•Persistent cough **and**

Consider other diagnosis

e.g. Viral Induced wheeze, Pneumonia, Pertussis, Cardiac anomaly



2.1 Admission:

Babies with bronchiolitis require admission if they need support with feeding or breathing.

NICE 2015 recommend admission if any of the following are met:

- History of apnoea (observed or reported)
- Persistent SpO2 <92% in air
- Inadequate oral intake (<50-75% usual volume)
- Persisting respiratory distress
  - Marked chest recession
  - Grunting
  - Respiratory rate >70 breaths/minute

There should also be a consideration of the risk factors for severity of illness. For example, the threshold for admission of a 3 week old or ex-premature baby would be much lower than an otherwise healthy 5 month old baby.

A series of papers published since the NICE guidance suggest saturations of 90% in air as the decision point, although these trials include children of 6 weeks old and over. The guideline has been altered to reflect this; **the saturations decision point for admission, oxygen and discharge is therefore:**

90%	92%
• Children aged over six weeks ***and*** • With clinical diagnosis of bronchiolitis ***and*** • With no other significant or contributing co-morbidities	All other children, meaning: • Children under six weeks, or • Children who don't have bronchiolitis, or • Children with co-morbidities

Please see section 2.6 for more detail regarding oxygen support.

2.2 Cause

Common causes of bronchiolitis include:

- Respiratory Syncitial Virus (RSV): 70% of cases
- Human metapneumovirus
- Adenovirus
- Parainfluenza virus

2.3 Risk factors for severe bronchiolitis[1]

- Chronic lung disease
- Congenital heart disease
- Age < 3 months

- Prematurity (born <32 weeks gestation)
- Neuromuscular disorder
- Immunodeficiency

2.4 Differential diagnosis

- Pneumonia
- Pertussis – consider especially in children presenting with apnoea
- Viral induced wheeze
- Foreign body
- Congenital airway anomaly
- Cardiac anomaly
- Reflux
- Mediastinal mass

2.5 Investigations

Few investigations are universally recommended in bronchiolitis.

All children should have:

- Oxygen saturation measurement

Some children may require:

- Capillary blood gas *only* if one or more of the following:
    - Apnoea
    - Severe respiratory distress
    - SpO_2 less than 92% in 50% inspired oxygen

The following investigations are NOT routinely indicated:

- Chest X-ray: Indications are
    - Severe illness
    - Diagnosis is uncertain
    - Localised signs
    - Cardiac murmur is detected

CXR in bronchiolitis will show hyperinflation, peribronchial thickening and often patchy areas of consolidation and collapse. This may lead to confusion with pneumonia, however treatment should be guided by clinical features and not X –ray findings alone.

- FBC: Only if there are features of sepsis, for example temperature over 39°c
- U&E: Only if the child is dehydrated and commencing IV fluids
- Blood cultures: Only if there are features of sepsis.

Testing for viruses in bronchiolitis

Viral testing is not necessary for children seen in the emergency department with bronchiolitis, and should not be performed for children being discharged home.

For children being admitted to the Children's Hospital testing should be in accordance with the current winter virus testing policy.

CED does not have near patient testing. Testing will therefore not be guiding the location of ward bed from the ED.

2.6 Management

Management of bronchiolitis is supportive and will include:

Oxygen Support

The NICE guidance describes saturations of 92% as the decision point for oxygen intervention. In north America, 90% has been used more traditionally, and this forms the basis of the AAP guidance. A series of papers published since the NICE guidance suggest 90% as the decision point, although these trials include children of 6 weeks old and over. The guideline has been altered to reflect this; the saturations decision point for admission, oxygen and discharge is therefore:

90%	92%
• Children aged over six weeks ***and*** • With clinical diagnosis of bronchiolitis ***and*** • With no other significant or contributing co-morbidities	All other children, meaning: • Children under six weeks, or • Children who don't have bronchiolitis, or • Children with co-morbidities

Give supplemental oxygen if SpO_2 is persistently less than 92% in air under six weeks, less than 90% six weeks and over and otherwise well. Where possible,oxygen should be delivered with humidification. Standard nasal prongs can be used to deliver oxygen up to 2 litres per minute. Consider high flow oxygen or nasal CPAP or invasive ventilation in a child with higher oxygen requirement, severe respiratory distress or apnoea.

There is a some evidence that over-reliance on oxygen saturations, and over diagnosis of hypoxia based on misinterpretation of transient self-limiting desaturations may result in unnecessary treatment. Continuous pulse oximetry is recommended for children who are unwell and admitted with bronchiolitis. However when children are in the recovery phase of otherwise uncomplicated bronchiolitis, consideration should be given to reducing the burden of monitoring – for example intermittent monitoring.

Hydration Support

Continue normal feeds (breast, bottle, solids) if tolerated. Supplemental feeds may sometimes be required.

<u>Nasogastric feeds</u>

Indications:

- Dehydration – is the baby clinically dehydrated? In breast fed babies, are they taking regular feeds, for a reasonable length of time? Do they have three or more wet nappies in a 24 hour period? In bottle fed babies, you might assess insufficient oral intake by normal route; less than 20 ml per kg per feed – i.e. less than about half of normal requirements.
- Marked increase in work of breathing with poor co-ordination of sucking, swallowing and breathing
- Respiratory rate more than 60 breaths per minute

Nasogastric feeds should be given at maintenance requirements as bolus feeds every three hours in mild/moderate respiratory distress. More frequent feeds should be used if respiratory distress is worsening.

<u>IV fluids</u>

Indications:

As for nasogastric feeds, plus:

- Deterioration of respiratory status during nasogastric feeding
- Severe respiratory distress, for example, RR over 80 breaths per minute and recession.
- Persistent vomiting

Start fluids at 100% maintenance, as long as the starting sodium is not below 135. U&Es should be rechecked in the first 24 hours. Restricted fluids are only indicated if the sodium is less than 135. Under these circumstances, restrict fluids to two thirds maintenance due to the risk of syndrome of inappropriate antidiuretic hormone release (SIADH).

Monitoring and ongoing care

Birmingham Children's Hospital have produced a bronchiolitis bedside care bundle (see appendix 1). This should be displayed by the bedside to help guide the aims of care for babies with bronchiolitis.

Babies should receive standard nursing observations, including saturation monitoring and fluid balance. They should have minimal handling. An apron and gloves should be worn for patient contact with strict handwashing adhered to.

Upper airway suctioning should be performed in children presenting with apnoea, and can be considered if upper airway secretions are seen to be causing respiratory distress or feeding difficulty. ***Do not routinely prescribe bronchodilators, antibiotics, steroids, saline nebs or nose drops.*** In healthy, immunocompetent patients, drug treatment and physiotherapy are ineffective.

The natural history of RSV bronchiolitis is a worsening of the illness until day 4, then recovery to completely well by day 7 or 8. This should be factored in during active weaning from any additional support.

The signs of deterioration that should be looked for are:

- Respiratory rate greater than 60 breaths per minute
- Apnoea, bradypnoea or cyanotic episodes despite supplemental oxygen.
- Persistent tachycardia
- Drowsiness/lethargy
- Severe intercostal recession
- Oxygen requirement greater than 40% O_2

High-Flow Nasal cannula (HFNC) Oxygen therapy

HFNC oxygen therapy refers to the delivery of a heated and humidified mixture of oxygen and air, at high flow rates which exceed the patient's spontaneous inspiratory flow. Based on current evidence, HFNC is not proposed as an alternative but as a bridge between low flow oxygen and nasal continuous positive airway pressure (nCPAP)/ invasive ventilation
The full SOP on starting HFNC in the Children's ED can be found on the intranet.
Humidified High Flow Nasal Oxygen (HHFNO) UHL Paediatric Emergency Department Guideline

For bronchiolitis, HFNC is escalated as follows:

- Start at 1 litre per kg body weight or close approximation, and observe for 10 to 20 minutes

- If there is no improvement, then increase to 2 litres per kg body weight, and observe for 10 to 20 minutes
- If there is no improvement, then a different support modality is needed.

HFNC weaning is indicated when the oxygen delivery is 30-40% and the respiratory distress is not severe.

During improvement, the steps of weaning are as follows:
- Highest support: 2 litres per kg body weight or close approximation
- Step down support: 1 litre per kg body weight, or close approximation
- Then stop HFNC, and transfer to headbox or nasal cannula oxygen if required
- After any weaning, observe for 10 to 20 minutes and be prepared to re-escalate. Re-escalation would be to the starting rate, or, if there is serious deterioration, escalate as appropriate.
- Attempt to wean any stable child every 4 to 8 hours.

Do not give HFNC oxygen therapy:
- For isolated increased work of breathing in the absence of an oxygen requirement
- If the child is maintaining adequate saturations in air

Children who are deteriorating on oxygen or HFNC may require nCPAP or invasive ventilation and require immediate senior medical review.

2.7 Discharge Advice

Parents/carers must be provided with an information leaflet when the diagnosis of bronchiolitis is made. Caring for your child when bronchiolitis effects their breathing (leicestershospitals.nhs.uk). This provides information on the diagnosis, prognosis and signs of deterioration to watch out for following discharge. It also includes the fact that if you are discharging the child early in the illness the child may get worse before they get better.
Parents should be advised that smoking (either in or outside of the home) will likely increase the severity or duration of the illness. Cough post-bronchiolitis is commonly seen to persist for days, if not weeks after recovery from bronchiolitis.

When to consider discharge

Most children can go home from hospital once they have had

•Oxygen saturations ≥90% or 92% (see section on oxygen management) in air (awake and asleep) for at least 6 hours if there was an initial oxygen requirement.

•2 consectutive good feeds

3. Education and Training

Ensure healthcare professionalperforming pulse oximetry are appropriately trained in its use specifically in infants and young children.

4. Monitoring Compliance

What will be measured to monitor compliance	How will compliance be monitored	Monitoring Lead	Frequency	Reporting arrangements

Use of NPA for RSV –100% of admissions to wards	Snap shot retrospective review of records	Guideline Contact	Biennially	Audit
Cohorting as per NPA results on wards	Review of ward bed state	Ward sister	6 monthly	Audit
Providing discharge information to parents/carers100%	Snap shot retrospective review of records	Guideline Contact	Biennially	Audit

5. Supporting References

Cochrane 2014. Gadomski AM, Scribani MB. Bronchodilators for bronchiolitis for infants with first-time wheezing. 17 June 2014 www.cochrane.org/CD001266/ARI accessed 06/06/2016

National Institute for Health and Care Excellence. Bronchiolitis in children: Diagnosis and Management. June 2015/ ng9.

A summary of the use of pulse oximetry in bronchiolitis: http://www.bmj.com/content/358/bmj.j3850 - this has led to some increased detail around the use of pulse oximetry in our practice

http://adc.bmj.com/content/early/2017/09/12/archdischild-2017-313950

Birmingham Children's Hospital Bronchiolitis Guideline 2019/20.

6. Key Words

Bronchiolitis, wheeze, oxygen saturation monitoring

The Trust recognises the diversity of the local community it serves. Our aim therefore is to provide a safe environment free from discrimination and treat all individuals fairly with dignity and appropriately according to their needs.
As part of its development, this policy and its impact on equality have been reviewed and no detriment was identified.

CONTACT AND REVIEW DETAILS	
Guideline Lead (Name and Title) A Atkinson - Consultant	**Executive Lead** **Chief Medical Officer**
Details of Changes made during review: **Clarified -** NICE guidance suggest **saturations** of 90% **in air** as the decision point. Vira testing statement changed to - **Viral testing is not necessary for children seen in the emergency department with bronchiolitis, and should not be performed for children being discharged home**. **Reference to COVID 19 removed** **Removed winter testing flow chart, to be imbedded once available**	

Appendix 1: Bedside care bundle