



Find out more from the National Paediatric Lead



All Wales Guideline for Ambulance Service Management of Bronchiolitis

Diagnosis

- Age <1 year
- A coryzal prodrome lasting 1 to 3 days
- Persistent cough
- Tachypnoea and/or chest recessions
- Crackles and/or wheeze

- Children age 1-2 years may also contract RSV bronchiolitis and should be managed similarly to infants
- COVID infection is unlikely to cause severe disease in children
- IPC precautions apply to all patients with respiratory infection
- Always take parental and caregiver concerns into account

Mild

- Oxygen sats >92%
- Mild respiratory distress
- Feeds >75% normal
- Wet nappies

Moderate

- Oxygen sats >92%
- Moderate respiratory distress
- Feeds 50-75% normal
- Decreased wet nappies

Severe

- Oxygen sats ≤92%
- Severe respiratory distress
- Feeds <50% normal
- Lethargic and tiring
- Apnoeas

Apnoeas may be the only clinical sign of bronchiolitis in young infants. Always consider alternative diagnoses.

If Oxygen sats <94%
Ambulance policy is for transfer to hospital for assessment

If Oxygen sats >94%

Use clinical judgement
Consider hospital review

- Early stages of illness (D1-3)
- Risk factors for severe disease
- Difficult social circumstances
- Low skills/ confidence in carer
- <4 weeks of age
- Previous respiratory admission

Discuss with Primary Care
Can child stay at home?

- Explain diagnosis
- Refer to patient advice sheet
- Explain expected time course for disease
- Discuss red flags suggesting deterioration
- Address parental smoking
- Think "safeguarding"
- Consider follow-up to monitor disease progress in 24-48 hours

Patient advice page and leaflet



Minimal handling
Oxygen to maintain sats >92%

Ambulance transfer to hospital

Hospital review

Alternative Diagnosis

High Fever (>39 °C, or >38 °C in age <3/12)

Poor capillary refill

Think bacterial infection:

- Pneumonia
- Sepsis
- Meningitis

Review

NICE NG143 Guideline: Fever in under 5s

Traffic light system for serious illness

Risk factors for severe disease

- Congenital heart disease
- Chronic lung disease
- Preterm (born <32 weeks gestation)
- Neuromuscular disorder
- Immunodeficiency

Low threshold for admission and individualised management plan

Respiratory distress

Mild

- Minimal chest recessions
- Tachypnoea
<50 breaths/min age <1yrs
<40 breaths/min age 1-2 yrs

Moderate

- Moderate chest recession
- Nasal flare
- Tachypnoea
>50 breaths/min age <1yrs
>40 breaths/min age 1-2 yrs

Severe

- Severe chest recession
- Expiratory grunting
- Use of accessory muscles
- Tachypnoea
>60 breaths/min

Evidence-based medicine

Bronchiolitis does not respond to:

- Hypertonic saline
- Bronchodilators
- Anticholinergics
- Inhaled steroids
- Oral steroids

Bronchiolitis

Bronchiolitis is a common condition diagnosed clinically by the presence of classical signs and symptoms. Despite years of research treatment remains supportive in nature. Minimal handling is best. It is important that all clinical staff are aware of the common signs and symptoms of bronchiolitis so that a diagnosis is made promptly avoiding unnecessary interventions and medications that have been shown to be ineffective. This pathway is not meant to be all encompassing but is supposed to offer guidance for infants presenting with classical symptoms of bronchiolitis.

Age at diagnosis

Bronchiolitis is a clinical diagnosis and is therefore based on clinical characteristics. It most commonly affects children under 1 year of age with a peak incidence between 3 and 6 months of age. Bronchiolitis can also affect children aged between 1 and 2 years but typical features at this age have significant potential overlap with other diagnoses including viral induced wheeze and pneumonia. This bronchiolitis pathway can be used to manage older children with bronchiolitis but it is vital to take a thorough, detailed history and clinical examination to make sure the correct diagnosis has been made before the pathway is initiated. For the Season 2020-2021, an RSV surge is expected including children age 1-2 years of age, since these children were not exposed to RSV in their first year of life.

Presenting symptoms

Symptoms of bronchiolitis usually peak between 3 and 5 days. An initial coryzal illness is followed by a persistent cough. Signs of increased work of breathing include an increased respiratory rate and chest recessions. Auscultation frequently reveals widespread inspiratory crackles with or without expiratory wheeze. In 90% of infants the cough will have resolved by 3 weeks. Wheeze is caused by secretions and oedema narrowing the airways. There is very limited bronchial muscle spasm explaining why salbutamol is usually ineffective.

Young infants, particularly those under 6 weeks of age, can present with apnoea even when no other respiratory signs and symptoms are present. However, apnoeas in this age group can be caused by many other diagnoses, especially sepsis. It is therefore important that children with apnoeas undergo detailed evaluation to rule out other causes before a diagnosis of bronchiolitis is established. RSV associated apnoea in young infants responds well to pressure support. Rapid escalation to CPAP is therefore recommended for any infant experiencing significant RSV associated apnoeas, with a low threshold for intubation and ventilation if ongoing.

Risk factors for severe disease

Bronchiolitis has a broad spectrum of disease severity. There are many different factors that play a role in an infant's experience of a bronchiolitic illness. Six major factors are consistently associated with severe disease and should be considered when determining which children are admitted to hospital. They are:

- chronic lung disease (including bronchopulmonary dysplasia)
- congenital heart disease, particularly if this is hemodynamically significant
- young age, particularly less than 3 months
- prematurity, particularly less than 32 weeks
- neuromuscular disorders
- immunodeficiency

Infants with risk factors for severe disease can deteriorate quickly. Although this pathway can be used for children with risk factors for severe disease, clinicians should have a low threshold for admission and escalation of treatment in a more individualised manner.

Thresholds for oxygen therapy

Symptoms of bronchiolitis gradually worsen over 3 to 5 days before they peak and then begin to improve. There are therefore two main phases in which infants suffering from bronchiolitis present to healthcare services. The first is the early phase when symptoms are still potentially worsening. Infants reviewed in hospital during this stage may deteriorate further before their symptoms peak. An oxygen treatment threshold of 92% is therefore pragmatic to ensure any mild deterioration does not result in significant hypoxia.

Phase two of bronchiolitis is the recovery phase. The Bronchiolitis of Infancy Discharge Study (BIDS) compared the safety of accepting oxygen saturations of 90% versus 94% before starting supplemental oxygen. The study included 615 infants between the ages of 6 weeks and 1 year admitted with bronchiolitis. Outcomes showed that infants offered supplemental oxygen only if their oxygen saturations were below 90% had a reduced need for oxygen, a shorter duration of hospital stay, were quicker to regain satisfactory feeding, had fewer readmissions to hospital and had an equivalent time taken for symptom resolution. It is therefore safe to discharge hospitalised infants who are in the recovery phase of bronchiolitis if their oxygen saturations are equal to or greater than 90% in air.

Use of chest X-rays

Do not routinely perform a chest X-ray in children with bronchiolitis, because changes on X-ray may mimic bacterial pneumonia and should not be used to determine the need for antibiotics. X-rays may have a role in the assessment of rapidly deteriorating infants needing respiratory support or those with prolonged symptoms that do not follow the usual expected course of a child with bronchiolitis.

Escalation of respiratory support

Low flow oxygen therapy via nasal cannulae is well tolerated in young infants. A maximum of 2L/min can be provided in this way before humidification of the oxygen is required.

Hi-flow humidified oxygen has been shown to reduce work of breathing in infants with bronchiolitis and a recent large randomised controlled trial has suggested that hi-flow, used early in the disease, may reduce the need for escalation of care and transfer to PICU. However, there is no evidence that hi-flow use reduces length of oxygen treatment, or length of hospital stay. Early use of Hi-flow in this way in a stable infant group can safely take place on the general paediatric ward but failure of treatment should be regularly assessed to swiftly identify those infants needing admission to critical care. Franklin et al. (NEJM 2018) have shown Hi flow can be safely commenced at 2L/kg/min for all infants with no increased risk of complications such as pneumothorax. A positive response to Hi-flow (reduced work of breathing, reduced oxygen requirement, reduced heart rate) should be seen within 2 hours of initiation. As infants recover, they may be switched back directly to low flow oxygen from Hi-flow when they have oxygen saturations >90% in an FiO_2 of less than 30%. Feeding by mouth on Hi-Flow risks aspiration. Early switch back to low flow oxygen enables quicker establishment of oral feeds as the infant improves.

Hi-flow is not a replacement for CPAP. Airway oedema and increased secretions caused by bronchiolitis leads to patchy atelectasis in the small airways causing hypoxia. An oxygen requirement of >60% on hi-flow therapy designates failure of therapy and support should be escalated to CPAP or invasive ventilation. PEEP generated by CPAP can help open blocked small airways and improve symptoms and oxygenation. CPAP should be considered early in young infants with apnoeas, early in infants with severe disease, and if no response is seen after 2 hours of Hi Flow therapy.

Feeding

Any illness such as bronchiolitis that increases work of breathing in young infants usually impacts an infant's ability to feed. Shortness of breath will naturally lead to slower feeding and reduced fluid intake. An infant's frequency of feeding may therefore increase to maintain daily fluid volumes. As the disease progresses fluid intake may fall. Daily volumes of between 50 to 75% of normal may helpfully reduce lung secretions. However, volumes less than 50% risk the development of significant dehydration. Infants not maintaining a minimum safe daily volume should have their feeding supported. When safe to do so enteral feeding should be continued via a nasogastric or orogastric tube to maintain caloric intake and prevent the need for electrolyte monitoring. Nasogastric/orogastric feeding can be safely continued in infants receiving hi flow therapy who are clinically stable or improving. Oral feeds should be avoided while on Hi-flow oxygen therapy since there is risk of aspiration.

Intravenous fluids should be considered if infants are not tolerating enteral feeds (e.g. significantly increased work of breathing following feeds) or are at risk of impending respiratory failure and artificial ventilation. The fluid choice should be isotonic and started at 80% of usual IV maintenance volumes. Any child receiving intravenous fluids should have their electrolytes monitored at least once every 24 hours.

Safe discharge

When considering discharge from hospital it is important to explain the diagnosis of bronchiolitis including the natural history of symptoms such as cough, to prevent unnecessary concern and healthcare usage. A discussion of red flag signs and symptoms of deterioration is vital, especially in the early stages of illness, and this should be accompanied by sensible advice regarding rapid access for a clinical review if required. Infants requiring CPAP or invasive ventilation on PICU are more likely to have a protracted recovery time, and further admissions to hospital with viral related chest infections. Consideration should therefore be given to outpatient paediatric follow-up to manage recurrent symptoms.