

Bronchiolitis in children: diagnosis and management

NICE guideline

Published: 1 June 2015

www.nice.org.uk/guidance/ng9

Your responsibility

The recommendations in this guideline represent the view of NICE, arrived at after careful consideration of the evidence available. When exercising their judgement, professionals and practitioners are expected to take this guideline fully into account, alongside the individual needs, preferences and values of their patients or the people using their service. It is not mandatory to apply the recommendations, and the guideline does not override the responsibility to make decisions appropriate to the circumstances of the individual, in consultation with them and their families and carers or guardian.

Local commissioners and providers of healthcare have a responsibility to enable the guideline to be applied when individual professionals and people using services wish to use it. They should do so in the context of local and national priorities for funding and developing services, and in light of their duties to have due regard to the need to eliminate unlawful discrimination, to advance equality of opportunity and to reduce health inequalities. Nothing in this guideline should be interpreted in a way that would be inconsistent with complying with those duties.

Commissioners and providers have a responsibility to promote an environmentally sustainable health and care system and should assess and reduce the environmental impact of implementing NICE recommendations wherever possible.

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This guideline is the basis of QS122.

Overview

This guideline covers diagnosing and managing bronchiolitis in children. It aims to help healthcare professionals diagnose bronchiolitis and identify if children should be cared for at home or in hospital. It describes treatments and interventions that can be used to help with the symptoms of bronchiolitis.

Who is it for?

- Healthcare professionals
- Parents or carers of children with bronchiolitis

Introduction

Bronchiolitis is the most common disease of the lower respiratory tract during the first year of life. It usually presents with cough with increased work of breathing, and it often affects a child's ability to feed. In primary care, the condition may often be confused with a common cold, though the presence of lower respiratory tract signs (wheeze and/or crackles on auscultation) in an infant in mid-winter would be consistent with this clinical diagnosis. The symptoms are usually mild and may only last for a few days, but in some cases the disease can cause severe illness.

There are several individual and environmental risk factors that can put children with bronchiolitis at increased risk of severe illness. These include congenital heart disease, neuromuscular disorders, immunodeficiency and chronic lung disease.

The management of bronchiolitis depends on the severity of the illness. In most children bronchiolitis can be managed at home by parents or carers.

Approximately 1 in 3 infants will develop clinical bronchiolitis in the first year of life and 2–3% of all infants require hospitalization. In 2011/12 in England, there were 30,451 secondary care admissions for the management of bronchiolitis. It is uncommon for bronchiolitis to cause death. In 2009/10 in England, there were 72 recorded deaths of children within 90 days of hospital admission for bronchiolitis.

Bronchiolitis is associated with an increased risk of chronic respiratory conditions, including asthma, but it is not known if it causes these conditions.

The guideline covers children with bronchiolitis but not those with other respiratory conditions, such as recurrent viral induced wheeze or asthma.

Medicine recommendations

The guideline will assume that prescribers will use a drug's summary of product characteristics to inform decisions made with individual patients.

Key priorities for implementation

The following recommendations have been identified as priorities for implementation. The full list of recommendations is in [section 1](#).

- Diagnose bronchiolitis if the child has a coryzal prodrome lasting 1 to 3 days, followed by:
 - persistent cough and
 - either tachypnoea or chest recession (or both) and
 - either wheeze or crackles on chest auscultation (or both).
- When diagnosing bronchiolitis, take into account that young infants with this disease (in particular those under 6 weeks of age) may present with apnoea without other clinical signs.
- Immediately refer children with bronchiolitis for emergency hospital care (usually by 999 ambulance) if they have any of the following:
 - apnoea (observed or reported)
 - child looks seriously unwell to a healthcare professional
 - severe respiratory distress, for example grunting, marked chest recession, or a respiratory rate of over 70 breaths/minute
 - central cyanosis
 - persistent oxygen saturation of less than 92% when breathing air.
- Consider referring children with bronchiolitis to hospital if they have any of the following:
 - a respiratory rate of over 60 breaths/minute
 - difficulty with breastfeeding or inadequate oral fluid intake (50–75% of usual volume, taking account of risk factors [see recommendation 1.3.3] and using clinical judgement)
 - clinical dehydration.
- When assessing a child in a secondary care setting, admit them to hospital if they have any of the following:

- - apnoea (observed or reported)
 - persistent oxygen saturation of less than 92% when breathing air
 - inadequate oral fluid intake (50–75% of usual volume, taking account of risk factors [see recommendation 1.3.3] and using clinical judgement)
 - persisting severe respiratory distress, for example grunting, marked chest recession, or a respiratory rate of over 70 breaths/minute.
- Do not routinely perform a chest X-ray in children with bronchiolitis, because changes on X-ray may mimic pneumonia and should not be used to determine the need for antibiotics.
- Do not use any of the following to treat bronchiolitis in children:
 - antibiotics
 - hypertonic saline
 - adrenaline (nebulised)
 - salbutamol
 - montelukast
 - ipratropium bromide
 - systemic or inhaled corticosteroids
 - a combination of systemic corticosteroids and nebulised adrenaline.
- Give oxygen supplementation to children with bronchiolitis if their oxygen saturation is persistently less than 92%.
- Give fluids by nasogastric or orogastric tube in children with bronchiolitis if they cannot take enough fluid by mouth.
- Provide key safety information for parents to take away for reference for children who will be looked after at home. This should cover:
 - how to recognise developing 'red flag' symptoms:
 - ◇ worsening work of breathing (for example grunting, nasal flaring, marked chest recession)

- - - ◇ fluid intake is 50–75% of normal or no wet nappy for 12 hours
 - ◇ apnoea or cyanosis
 - ◇ exhaustion (for example, not responding normally to social cues, wakes only with prolonged stimulation)
 - that people should not smoke in the child's home because it increases the risk of more severe symptoms in bronchiolitis
 - how to get immediate help from an appropriate professional if any red flag symptoms develop
 - arrangements for follow-up if necessary.

1 Recommendations

People have the right to be involved in discussions and make informed decisions about their care, as described in [your care](#).

[Making decisions using NICE guidelines](#) explains how we use words to show the strength (or certainty) of our recommendations, and has information about professional guidelines, standards and laws (including on consent and mental capacity), and safeguarding.

1.1 Assessment and diagnosis

- 1.1.1 When diagnosing bronchiolitis, take into account that it occurs in children under 2 years of age and most commonly in the first year of life, peaking between 3 and 6 months.
- 1.1.2 When diagnosing bronchiolitis, take into account that symptoms usually peak between 3 and 5 days, and that cough resolves in 90% of infants within 3 weeks.
- 1.1.3 Diagnose bronchiolitis if the child has a coryzal prodrome lasting 1 to 3 days, followed by:
- persistent cough and
 - either tachypnoea or chest recession (or both) and
 - either wheeze or crackles on chest auscultation (or both).
- 1.1.4 When diagnosing bronchiolitis, take into account that the following symptoms are common in children with this disease:
- fever (in around 30% of cases, usually of less than 39°C)
 - poor feeding (typically after 3 to 5 days of illness).
- 1.1.5 When diagnosing bronchiolitis, take into account that young infants with this disease (in particular those under 6 weeks of age) may present with apnoea without other clinical signs.
- 1.1.6 Consider a diagnosis of pneumonia if the child has:

- high fever (over 39°C) and/or
- persistently focal crackles.

See also the [NICE guideline on sepsis](#) and [risk stratification tool for sepsis in under 5s](#).

1.1.7 Think about a diagnosis of viral-induced wheeze or early-onset asthma rather than bronchiolitis in older infants and young children if they have:

- persistent wheeze without crackles or
- recurrent episodic wheeze or
- a personal or family history of atopy.

Take into account that these conditions are unusual in children under 1 year of age.

1.1.8 Measure oxygen saturation in every child presenting with suspected bronchiolitis, including those presenting to primary care if pulse oximetry is available.

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

1.1.10 Suspect impending respiratory failure, and take appropriate action as these children may need intensive care (see [recommendations 1.2.1](#) and [1.4.5](#)), if any of the following are present:

- signs of exhaustion, for example listlessness or decreased respiratory effort
- recurrent apnoea
- failure to maintain adequate oxygen saturation despite oxygen supplementation.

1.2 When to refer

1.2.1 Immediately refer children with bronchiolitis for emergency hospital care (usually by 999 ambulance) if they have any of the following:

- apnoea (observed or reported)

- child looks seriously unwell to a healthcare professional
- severe respiratory distress, for example grunting, marked chest recession, or a respiratory rate of over 70 breaths/minute
- central cyanosis
- persistent oxygen saturation of less than 92% when breathing air.

1.2.2 Consider referring children with bronchiolitis to hospital if they have any of the following:

- a respiratory rate of over 60 breaths/minute
- difficulty with breastfeeding or inadequate oral fluid intake (50–75% of usual volume, taking account of risk factors [see [recommendation 1.3.3](#)] and using clinical judgement)
- clinical dehydration.

1.2.3 When deciding whether to refer a child with bronchiolitis to secondary care, take account of any known risk factors for more severe bronchiolitis such as:

- chronic lung disease (including bronchopulmonary dysplasia)
- haemodynamically significant congenital heart disease
- age in young infants (under 3 months)
- premature birth, particularly under 32 weeks
- neuromuscular disorders
- immunodeficiency.

1.2.4 When deciding whether to refer a child to secondary care, take into account factors that might affect a carer's ability to look after a child with bronchiolitis, for example:

- social circumstances
- the skill and confidence of the carer in looking after a child with bronchiolitis at home

- confidence in being able to spot red flag symptoms (see [recommendation 1.6.1](#))
- distance to healthcare in case of deterioration.

1.3 When to admit

1.3.1 Measure oxygen saturation using pulse oximetry in every child presenting to secondary care with clinical evidence of bronchiolitis.

1.3.2 When assessing a child in a secondary care setting, admit them to hospital if they have any of the following:

- apnoea (observed or reported)
- persistent oxygen saturation of less than 92% when breathing air
- inadequate oral fluid intake (50–75% of usual volume, taking account of risk factors [see recommendation 1.3.3] and using clinical judgement)
- persisting severe respiratory distress, for example grunting, marked chest recession, or a respiratory rate of over 70 breaths/minute.

1.3.3 When deciding whether to admit a child with bronchiolitis, take account of any known risk factors for more severe bronchiolitis such as:

- chronic lung disease (including bronchopulmonary dysplasia)
- haemodynamically significant congenital heart disease
- age in young infants (under 3 months)
- premature birth, particularly under 32 weeks
- neuromuscular disorders
- immunodeficiency.

1.3.4 When deciding whether to admit a child, take into account factors that might affect a carer's ability to look after a child with bronchiolitis, for example:

- social circumstances

- the skill and confidence of the carer in looking after a child with bronchiolitis at home
- confidence in being able to spot red flag symptoms (see [recommendation 1.6.1](#))
- distance to healthcare in case of deterioration.

1.3.5 Clinically assess the hydration status of children with bronchiolitis.

1.3.6 Do not routinely perform blood tests in the assessment of a child with bronchiolitis.

1.3.7 Do not routinely perform a chest X-ray in children with bronchiolitis, because changes on X-ray may mimic pneumonia and should not be used to determine the need for antibiotics.

1.3.8 Consider performing a chest X-ray if intensive care is being proposed for a child.

1.3.9 Provide parents or carers with key safety information (see [recommendation 1.6.1](#)) if the child is not admitted.

1.4 Management of bronchiolitis

1.4.1 Do not perform chest physiotherapy on children with bronchiolitis who do not have relevant comorbidities (for example spinal muscular atrophy, severe tracheomalacia).

1.4.2 Consider requesting a chest physiotherapy assessment in children who have relevant comorbidities (for example spinal muscular atrophy, severe tracheomalacia) when there may be additional difficulty clearing secretions.

1.4.3 Do not use any of the following to treat bronchiolitis in children:

- antibiotics
- hypertonic saline
- adrenaline (nebulised)
- salbutamol
- montelukast

- ipratropium bromide
 - systemic or inhaled corticosteroids
 - a combination of systemic corticosteroids and nebulised adrenaline.
- 1.4.4 Give oxygen supplementation to children with bronchiolitis if their oxygen saturation is persistently less than 92%.
- 1.4.5 Consider continuous positive airway pressure (CPAP) in children with bronchiolitis who have impending respiratory failure (see [recommendation 1.1.10](#)).
- 1.4.6 Do not routinely perform upper airway suctioning in children with bronchiolitis.
- 1.4.7 Consider upper airway suctioning in children who have respiratory distress or feeding difficulties because of upper airway secretions.
- 1.4.8 Perform upper airway suctioning in children with bronchiolitis presenting with apnoea even if there are no obvious upper airway secretions.
- 1.4.9 Do not routinely carry out blood gas testing in children with bronchiolitis.
- 1.4.10 Consider carrying out capillary blood gas testing in children with severe worsening respiratory distress (when supplemental oxygen concentration is greater than 50%) or suspected impending respiratory failure (see [recommendation 1.1.10](#))
- 1.4.11 Give fluids by nasogastric or orogastric tube in children with bronchiolitis if they cannot take enough fluid by mouth.
- 1.4.12 Give intravenous isotonic fluids (see the [NICE guideline on intravenous fluids therapy in children](#)) to children who:
- do not tolerate nasogastric or orogastric fluids or
 - have impending respiratory failure.

1.5 When to discharge

1.5.1 When deciding on the timing of discharge for children admitted to hospital, make sure that the child:

- is clinically stable
- is taking adequate oral fluids
- has maintained oxygen saturation over 92% in air for 4 hours, including a period of sleep.

1.5.2 When deciding whether to discharge a child, take into account factors that might affect a carer's ability to look after a child with bronchiolitis, for example:

- social circumstances
- the skill and confidence of the carer in looking after a child with bronchiolitis at home
- confidence in being able to spot red flag symptoms (see [recommendation 1.6.1](#))
- distance to healthcare in case of deterioration.

1.5.3 Provide parents or carers with key safety information (see recommendation 1.6.1) when the child is discharged.

1.6 Key safety information for looking after a child at home

1.6.1 Provide key safety information for parents and carers to take away for reference for children who will be looked after at home. This should cover:

- how to recognise developing 'red flag' symptoms:
 - worsening work of breathing (for example grunting, nasal flaring, marked chest recession)
 - fluid intake is 50–75% of normal or no wet nappy for 12 hours
 - apnoea or cyanosis
 - exhaustion (for example, not responding normally to social cues, wakes only)

- – with prolonged stimulation).
- that people should not smoke in the child's home because it increases the risk of more severe symptoms in bronchiolitis
- how to get immediate help from an appropriate professional if any red flag symptoms develop
- arrangements for follow-up if necessary.

2 Research recommendations

The Guideline Development Group has made the following recommendations for research, based on its review of evidence, to improve NICE guidance and patient care in the future. The Guideline Development Group's full set of research recommendations is detailed in the [full guideline](#).

2.1 Oxygen saturation measurement in primary care

What is the clinical and cost effectiveness of oxygen saturation (SpO₂) measurement in primary care in children with bronchiolitis?

Why this is important

There are no studies to inform the use of SpO₂ measurement in primary care. SpO₂ is used routinely in secondary care to help decide on the need for admission to hospital. The clinical and cost effectiveness of SpO₂ measurement in primary care is also important. SpO₂ is not routinely measured in infants and young children with bronchiolitis in primary care. The value of SpO₂ measurement to help identify those who need admission to hospital should be assessed. Possible outcomes might be fewer or more infants being referred to hospital, or admitted.

2.2 Paediatric early warning score (PEWS) as predictors of deterioration

In children with bronchiolitis can paediatric early warning score (PEWS) predict deterioration?

Why this is important

In children with bronchiolitis there is clinical uncertainty about the prediction of deterioration. There are a number of clinical scores for bronchiolitis that include objective and subjective measures. No bronchiolitis score is currently in widespread use in clinical practice. Increasingly, PEWS are being employed generically in paediatric practice in the UK. The effectiveness of PEWS scores in predicting deterioration for infants with bronchiolitis needs to be assessed.

2.3 Combined bronchodilator and corticosteroid therapy for bronchiolitis

What is the efficacy of combined bronchodilator and corticosteroid therapy?

Why this is important

There are no effective therapies for the treatment of bronchiolitis. One study reported that infants provided with both nebulised adrenaline and systemic steroids had improved clinical outcomes. This was a subgroup analysis, so was not anticipated in the trial design and consequently the analysis was not adequately powered to answer this question. A multicentre randomised controlled trial (RCT) that assesses the clinical and cost effectiveness of combined adrenaline and corticosteroids treatment for bronchiolitis is needed.

2.4 High-flow humidified oxygen and oxygen

What is the clinical and cost effectiveness of high-flow humidified oxygen versus standard supplemental oxygen?

Why this is important

Providing oxygen (typically by nasal cannula) is standard care for bronchiolitis. Newly-developed medical devices can now deliver high-flow humidified oxygen that is thought to provide more comfortable and effective delivery of gases while retaining airway humidity. The use of this medical device is becoming widespread without demonstration of additional efficacy. A multicentre RCT comparing high-flow humidified oxygen and standard supplemental oxygen would be of benefit, as would including weaning strategies for high-flow humidified oxygen.

2.5 Nasal suction

What is the clinical and cost effectiveness of suction to remove secretions from the upper respiratory tract compared with minimal handling?

Why this is important

Suction is a commonly used therapy in bronchiolitis. Infants are obligate nasal breathers, so removal of secretions is thought to relieve respiratory distress. However, suction is distressing to infants and parents. Methods vary and there is no evidence on which approach, if any, is most

effective. In some trials it appears that minimal handling is more effective than therapies. A multicentre RCT comparing the clinical and cost effectiveness of suction (also covering different suction strategies, for example superficial versus deep) with minimal handling is needed.

Finding more information and resources

You can see everything NICE says on bronchiolitis in children in our interactive flowchart on [bronchiolitis in children](#).

To find out what NICE has said on topics related to this guideline, see our web page on [respiratory infections](#).

For full details of the evidence and the guideline committee's discussions, see the [full version](#). You can also find information about [how the guideline was developed](#), including details of the committee.

NICE has produced [tools and resources](#) to help you put this guideline into practice. For general help and advice on putting NICE guidelines into practice, see [resources to help you put guidance into practice](#).

Update information

Minor changes since publication

November 2019: A link to the [NICE guideline on sepsis and risk stratification tools for sepsis in under 5s](#) was added to recommendation 1.1.6. Recommendations 1.2.3 and 1.3.3 were amended to clarify that any known risk factors for more severe bronchiolitis should be taken into account when deciding on referral or admission.

ISBN: 978-1-4731-1162-2

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