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PRACTICE

GUIDELINES

Bronchiolitis in children: summary of NICE guidance

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This is one of a series of *BMJ* summaries of new guidelines based on the best available evidence; they highlight important recommendations for clinical practice, especially where uncertainty or controversy exists.

Bronchiolitis is the most common lower respiratory tract infection in the first year of life: one in five infants is affected and 2-3% are admitted to hospital.[1] The diagnosis is made on clinical evidence and clinicians need to be confident with their decision. An initial coryzal illness progresses over three to five days to troublesome cough, increased work of breathing, and difficulty feeding. Mild cases can be managed at home, but infants with severe respiratory distress, difficulty taking adequate oral fluids, or with apnoea require secondary care. There are no effective treatments and hospitals provide supportive care with oxygen and hydration. Parents should be told about red flag symptoms that need prompt clinical review and should be aware that symptoms (mostly cough) may persist for weeks after the acute illness.[2]

This article summarises the most recent recommendations from the National Institute for Health and Care Excellence (NICE) on how to diagnose and manage infants and children with bronchiolitis.[3]

Recommendations

NICE recommendations are based on systematic reviews of best available evidence and explicit consideration of cost effectiveness. When minimal evidence is available, recommendations are based on the guideline development group's experience and opinion of what constitutes good practice. Evidence levels for the recommendations are given in italic in square brackets.

Assessment and diagnosis

- 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 of age. [*Based on low to very low quality evidence from observational studies and the experience and opinion of the guideline development group (GDG).*]
- When diagnosing bronchiolitis, take into account that symptoms usually peak between three and five days, and that cough resolves in 90% of infants within three weeks. [*Based on very low to low quality evidence from observational studies and the experience and opinion of the GDG.*]
- Diagnose bronchiolitis if the child has a coryzal prodrome lasting one to three days, followed by:
  -Persistent cough and
  -Tachypnoea or chest recession (or both) and
  -Wheeze or crackles on chest auscultation (or both). [*Based on very low to low quality evidence from observational studies and the experience and opinion of the GDG.*]
- When diagnosing bronchiolitis, take into account that young infants with this disease (in particular those under 6 weeks of age) may present with apnoea but no other clinical signs. [*Based on very low to low quality evidence from observational studies and the experience and opinion of the GDG.*]
- When diagnosing bronchiolitis, take into account that the following symptoms are common in children with this disease:
  -Fever (in about 30% of cases, usually of less than 39°C)
  -Poor feeding (typically after three to five days of illness). [*Based on very low to low quality evidence from observational studies and the experience and opinion of the GDG.*]

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The bottom line

- A diagnosis of bronchiolitis helps parents understand that cough may persist for six weeks or more after acute illness
- Because acute bronchiolitis may become more severe, provide parents with red flag symptoms that should prompt clinical review
- Admission to hospital is for infants who cannot maintain adequate oral hydration or who have severe respiratory distress, apnoea, or hypoxia
- There are no effective treatments and minimal handling with adequate hydration is most important, with supplemental oxygen if needed

How patients were involved in the creation of this article

Committee members involved in the development of this guideline included two lay members who actively contributed to the formulation of the recommendations summarised here.

When to refer

- Immediately refer children with bronchiolitis for emergency hospital care (usually by 999 ambulance) if they have any of the following:
  -Apnoea (observed or reported)
  -Appear seriously unwell to a healthcare professional
  -Severe respiratory distress—for example, grunting, marked chest recession, or a respiratory rate of more than 70 breaths/min
  -Central cyanosis
  -Persistent oxygen saturation of less than 92% when breathing air. [*Based on the experience and opinion of the GDG.*]
- Consider referring children with bronchiolitis to secondary care if they have any of the following:
  -Respiratory rate of more than 60 breaths/min
  -Difficulty with breast feeding or inadequate oral fluid intake (<75% of usual volume)
  -Clinical dehydration. *[Based on the experience and opinion of the GDG.*]
- When deciding whether to refer a child with bronchiolitis to secondary care, take account of the following risk factors for more severe bronchiolitis:
  -Chronic lung disease (including bronchopulmonary dysplasia)
  -Haemodynamically significant congenital heart disease
  -Age in young infants (under 3 months)
  -Premature birth, particularly less than 32 weeks
  -Neuromuscular disorders
  -Immunodeficiency. [*Based on very low to moderate quality evidence from observational studies and the experience and opinion of the GDG.*]
- 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 section "Key safety information" below)
  -Distance to healthcare facility in case of deterioration. [*Based on the experience and opinion of the GDG.*]

When to admit

- Measure oxygen saturation in all children who present with suspected bronchiolitis, including those presenting to primary care, if pulse oximetry is available. [*Based on very low quality evidence from one observational study and the experience and opinion of the GDG.*]
- Clinically assess the hydration status of children with bronchiolitis. [*Based on the experience and opinion of the GDG.*]
- When assessing children 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 and using clinical judgment
  -Persisting severe respiratory distress—for example, grunting, marked chest recession, or a respiratory rate of more than 70 breaths/min. [*Based on the experience and opinion of the GDG.*]
- Do not routinely perform chest radiography in children with bronchiolitis because radiographic changes may mimic pneumonia and should not be used to determine the need for antibiotics. [*Based on very low quality evidence from observational studies.*]

Management of bronchiolitis

- Do not use any of the following to treat bronchiolitis in children:
  -Antibiotics
  -Hypertonic saline (nebulised)
  -Adrenaline (nebulised)
  -Salbutamol (inhaled or nebulised)
  -Montelukast
  -Ipratropium bromide
  -Systemic or inhaled corticosteroids
  -A combination of systemic corticosteroids and nebulised adrenaline
  -Chest physiotherapy on children with bronchiolitis who do not have relevant comorbidities (such as spinal muscular atrophy or severe tracheomalacia). [*Based on very low to moderate quality evidence from randomised controlled trials and the experience and opinion of the GDG.*]
- Ensure healthcare professionals performing pulse oximetry are appropriately trained in its use specifically in infants

and young children. [*Based on the experience and opinion of the GDG.*]

- Suspect impending respiratory failure and take appropriate action because intensive care may be needed in children with any of the following:
  -Signs of exhaustion—for example, listlessness or decreased respiratory effort
  -Recurrent apnoea
  -Failure to maintain adequate oxygen saturation despite oxygen supplementation. [*Based on the experience and opinion of the GDG.*]
- Give oxygen supplementation to children with bronchiolitis if their oxygen saturation is persistently less than 92%. [*Based on very low to low quality evidence from randomised controlled trials and the experience and opinion of the GDG.*]
- Give fluids by nasogastric or orogastric tube in children with bronchiolitis if they cannot take in enough fluid by mouth. [*Based on very low to low quality evidence from randomised controlled trials and the experience and opinion of the GDG.*]
- Consider upper airway suctioning in children who have respiratory distress or feeding difficulties because of upper airway secretions. [*Based on the experience and opinion of the GDG.*]
- Perform upper airway suctioning in children with bronchiolitis presenting with apnoea even if there are no obvious upper airway secretions. [*Based on the experience and opinion of the GDG.*]

When to discharge

- 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 four hours, including a period of sleep. [*Based on the experience and opinion of the GDG.*]

Key safety information for looking after a child at home

- Provide key safety information for children who will be looked after at home. This should include information for parents and carers on how to recognise developing red flag symptoms:
  -Worsening work of breathing (for example grunting, nasal flaring, marked chest recession)
  -Fluid intake less than 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). [*Based on the experience and opinion of the GDG.*]
- Also provide information on the following:
  -How to get immediate help from an appropriate healthcare professional if any red flag symptoms develop
  -Arrangements for follow-up if necessary.

Overcoming barriers

Increased confidence in diagnosing bronchiolitis should help healthcare professionals manage the condition without recourse to unnecessary referral and should avoid the use of inappropriate treatments. An accurate diagnosis could also help healthcare professionals provide appropriate information to parents and carers on the anticipated disease course and the red flag symptoms that should prompt parents to seek a clinical review. Accurate diagnosis and appropriate management should also reduce anxiety. It is important to inform parents and carers about the possibility of prolonged cough after bronchiolitis—often several weeks—to avoid unnecessary concern. The guideline should increase appropriate referral to secondary care, as well as appropriate decision making with regard to the need for admission and the criteria for timely and safe discharge from hospital. It should also help avoid unnecessary investigations (such as chest radiography) and treatments.

The members of the guideline development group were: Steve Cunningham (chair), Thomas Bourke, Kate Chadwick, Geoffrey John Crimmins, Julian Legg, Bhavee Mahesh Patel, Swansea; Clare van Miert, Julie McKnight, Debra Quantrill, Anshu Sharma. National Collaborating Centre for Women's and Children's Health technical team: Vanessa Delgado Nunes (from August 2014), Stephen Murphy, Anne Carty (from April 2014) Cristina Visintin (until April 2014), Valentina Ricci (from January 2014), Zosia Beckles, Jiri Chard (until August 2014), Katherine Cullen (until January 2015), Liz Bickerdike (until September 2013), Nitara Prasannan (until October 2014), and Paul Jacklin (from December 2014).

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1 Deshpande SA, Northern V. The clinical and health economic burden of respiratory syncytial virus disease among children under 2 years of age in a defined geographical area. *Arch Dis Child* 2003;88:1065-9.
2 Hall CB. Respiratory syncytial virus and parainfluenza virus. *N Engl J Med* 2001;344:1917-28.
3 National Institute for Health and Care Excellence. Bronchiolitis: diagnosis and management of bronchiolitis in children. (Clinical guideline ng9.) 2015. www.nice.org.uk/guidance/ng9.

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Further information on the guidance

Methods

This guidance was developed by the National Collaborating Centre for Women's and Children's Health in accordance with NICE guideline development methods (www.nice.org.uk/article/PMG6/chapter/1%20Introduction). A guideline development group (GDG) was established by the National Collaborating Centre for Women's and Children's Health, which incorporated healthcare professionals (including two paediatricians, two nurse practitioners, two consultants in paediatric respiratory medicine, one general practitioner, and one pharmacist) and lay members. The GDG identified relevant clinical questions, collected and appraised clinical evidence, and evaluated the cost effectiveness of proposed interventions where possible. The draft guideline underwent a public consultation in which stakeholder organisations were invited to comment; the GDG then took all comments into consideration when producing the final version of the guideline.

Four different versions of this guideline have been produced: a full version containing all the evidence, the process undertaken to develop the recommendations, and all the recommendations; a care pathway; a version containing a list of all the recommendations, known as the "NICE guideline"; and a version for the public (www.nice.org.uk/guidance/ng9/informationforpublic). All of these versions are available from the NICE website (www.nice.org.uk/guidance/ng9). Updates of the guideline will be produced as part of NICE's guideline development programme.

Future research

- What are the clinical effectiveness and cost effectiveness of measuring oxygen saturation in primary care in children with bronchiolitis?
- In children with bronchiolitis can the paediatric early warning score predict deterioration?
- What is the efficacy of combined bronchodilator and corticosteroid therapy?
- What are the clinical effectiveness and cost effectiveness of high flow humidified oxygen versus standard supplemental oxygen?
- What are the clinical effectiveness and cost effectiveness of suction to remove secretions from the upper respiratory tract compared with minimal handling?
- What features predict progressive recovery in children with bronchiolitis?
- What is the effectiveness of chest physiotherapy in children with bronchiolitis and impending respiratory failure?
- What is the efficacy of montelukast in the treatment of acute bronchiolitis in infants and children?
- What is the efficacy of heliox (a mixture of oxygen (21%) and helium (79%) that may reduce the need for continuous positive airways pressure in infants and children with severe bronchiolitis)?