



Consensus conference

**Management of bronchiolitis
in infants**

21 September 2000

Cité des Sciences et de l'Industrie de la Villette - Paris

About these guidelines¹

This consensus conference was held on 21 September 2000 at the Cité des Sciences et de l'Industrie de la Villette, Paris. It was conducted in accordance with the method recommended by the *Agence nationale de l'Accréditation et de l'Évaluation en Santé (ANAES)*². The conclusions and guidelines were drawn up by an independent conference jury. ANAES is not responsible for their content. Names of sponsors and supporting organisations are given in the Acknowledgements section.

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¹ The guidelines are taken from a full-length report in French available from the *Haute Autorité de santé* (French National Authority for Health) website: www.has-sante.fr.

² Since January 2005, ANAES has become part of the *Haute Autorité de santé (HAS)*.

Introduction

Acute bronchiolitis is a respiratory viral infection of infants that occurs in seasonal epidemics. It is spread by interhuman transmission. It is fostered by close contact, city life and the early use of community childcare facilities.

Because of the number of infants affected bronchiolitis is a public health problem (see section on epidemiology below). The number of cases is increasing every year. The current increase in the severity of the disease may be due a rise in occurrence in very young children who represent the most severe cases.

Most cases are managed in ambulatory care. However, the number of hospital visits and hospitalisations is increasing, leading to overloading of the healthcare system, particularly emergency departments, and to serious problems in finding hospital beds. The disease concerns many stakeholders in the healthcare system - general practitioners, paediatricians, physiotherapists, health insurance funds, decision-makers, etc.

Because of the uncertainties surrounding diagnosis and the range of options for managing the disease, a consensus conference was organised in 2000 by the *Union Régionale des Médecins Libéraux d'Ile-de-France* (Union of Independent Practitioners for the Ile-de-France region), at the initiative of the society "*Respirer*", in collaboration with other sponsors (see Acknowledgements). The scope of the conference was limited to management of children aged 1-24 months and to the first episode of infection, so excluding infantile asthma.

The knowledge base on the subject was felt to be inadequate. Published data are sometimes contradictory and there are few data on clinical practice. There is a gap between current clinical practice and the state-of-the-art. The steering committee drew up a list of 6 questions.

QUESTION 1 – What is the natural history of bronchiolitis?

The term "bronchiolitis" covers all forms of obstructive bronchial disease usually related to the human respiratory syncytial virus (RSV). It occurs in epidemics in infants aged 1-24 months. The guidelines that follow are limited to the first episode of bronchiolitis.

- **Epidemiology and physiopathology**

There are 460 000 cases of bronchiolitis a year in France (30% of infants), with peak incidence between 2 and 8 months. The epidemic peak occurs during the winter.

The main infectious agent for winter bronchiolitis is RSV, which is implicated in 60-90% of cases but other viruses may also be responsible, particularly *Haemophilus parainfluenzae* (5-20% of cases). RSV is transmitted either directly, by contaminated secretions, or indirectly, by the hands or contaminated objects. The incubation period is 2-8 days. The virus is eliminated usually in 3-7 days but elimination may take up to 4 weeks. Airways are obstructed both by an intraluminal mucus plug and by inflammation of the bronchiolar wall. Bronchospasm has only a minor role because development of bronchial smooth muscle is poor. The disease usually resolves spontaneously. Effective mucociliary activity is restored 3-4 weeks after the acute phase. In rare cases there may be anatomical sequelae (obliterative bronchiolitis, bronchiectasis).

Whether any specific factors such as pre-existing respiratory abnormalities, Th1/Th2 immune imbalance and passive smoking encourage the development of bronchiolitis during primary RSV infection is a moot point. Environmental factors (type of childcare) seem to be risk factors for recurrent bronchiolitis.

- **Clinical features**

RSV infection begins with nasopharyngitis with slight fever and a dry cough. In 20% of cases only, this is followed by bronchiolar disease.

The signs of bronchiolitis are dyspnoea and tachypnoea. Expiration is restricted. Respiratory distress may interfere with feeding. Chest hyperinflation and respiratory effort are proportional to the degree of obstruction, except at the exhaustion stage.

At the onset, auscultation is dominated by dry, crepitant rales and/or moist, subcrepitant rales, especially in young infants. Sibilant rales rapidly appear and are often audible at a distance (wheezing). Auscultation reveals more signs after the age of 1 year, dominated by sibilant rales. Auscultation may be silent in severe forms with chest hyperinflation.

- **Further investigations**

Further investigations are not usually indicated in common forms of bronchiolitis.

- **Clinical course**

In the great majority of cases, the clinical course is favourable; signs of obstruction last for 8-10 days. A residual cough may persist for a further fortnight. The risk of serious respiratory distress is greater in children under 6 weeks old. Mortality rates vary in studies but are often zero in recent studies.

Bacterial infection (*Haemophilus influenzae*, *Streptococcus pneumoniae*, *Moraxella catarrhalis*) may coexist with the viral infection, and should be distinguished from bacterial colonisation.

Bronchiolitis recurs during the first 2 years of life in 23-60% of infants. After the third episode of obstruction, the term "infantile asthma" is generally used. Progression to infantile asthma mainly depends on the presence of atopy.

QUESTION 2 – When is admission to hospital necessary?

Admission to hospital should be decided by a doctor, based on precise indications, and should only concern a minority of children.

A child should be admitted to hospital if any of the major severity criteria given in Box 1 are present (grade³ C). Hospital provides the child's doctor with a second medical opinion, an extended assessment and/or can help the infant over a difficult stage in the disease. This can be done in a very short stay hospital unit. Other criteria, above and beyond those

³ Guidelines were graded from A to C according to level of evidence of studies:

- A: established scientific evidence
- B: presumption of scientific evidence
- C: low level of scientific evidence
- If no grade is given, they are based on agreement among the members of the jury.

in Box 1, that need to be weighed up before admitting an infant to hospital are given in Box 2. All concerned must be very vigilant as the child's condition may deteriorate rapidly. The doctor should provide the family with precise information and ensure that they have clearly understood the signs of deterioration given in Box 3. If the child's condition deteriorates, a doctor should reassess the situation as soon as possible.

Box 1. Severity criteria for admitting infants to hospital

- Major deterioration in general condition
- Onset of apnoea, presence of cyanosis
- Respiratory rate > 60/minute
- Age < 6 weeks
- Prematurity < 34 gestational age, corrected age < 3 months
- Underlying heart disease, severe chronic pulmonary disease
- Transcutaneous arterial oxygen saturation (SaO₂) < 94% in room air and at rest or when feeding
- Gastrointestinal disorders compromising hydration, dehydration with weight loss > 5%
- Psychosocial problems
- Ventilatory disorders detected by chest radiograph carried out because of clinical signs or symptoms

Box 2. Other criteria to be weighed up before admitting an infant to hospital

- Clinical factors
 - degree of deterioration in general condition
 - severity of respiratory problems
 - child's age
- History, taking account of
 - parent's observations ("being poorly", change in behaviour)
 - infant's history
 - persistence of respiratory problems
- General situation
 - the family's ability to monitor the child and understand the disease, and whether they have access to care
 - child's living conditions
 - local health resources

Box 3. Signs of deterioration to be noted by families

- Refusing feeds
- Digestive problems
- Change in behaviour and deterioration in respiration
- Rise in temperature

• **What is the role of pulse oximetry in infants?**

Pulse oximetry is useful to assess the severity of bronchiolitis in infants. Oxygen saturation of less than 94% (jury's agreement) is an indicator of severity. Oximetry values are used to monitor hospitalised infants (grade B); they can be used to adjust the oxygen flow. No studies have been carried out in an outpatient setting. It is therefore not possible to say whether pulse oximetry is essential in non-hospital practice.

QUESTION 3 – What treatments other than physiotherapy?

- **General measures**

Management of acute bronchiolitis in infants is mainly symptomatic. The general measures to be taken are rarely addressed in the literature. They have not been the subject of scientific studies but are based on everyday experience.

Hydration, nutrition

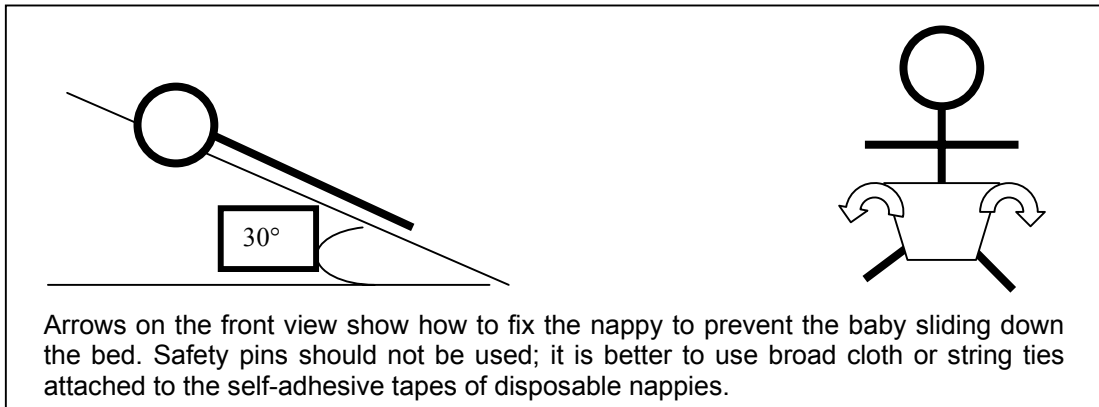
It is essential to maintain a level of hydration that satisfies the infant's basic requirements. Feeding difficulties may require:

- simple measures such as nasopharynx decongestion before feeds, giving smaller feeds more often and, possibly, thickening the feed
- if necessary, enteral feeding (by nasogastric tube) or parenteral nutrition.

There is no indication for antireflux therapy (grade A).

Lying position

The ideal position is dorsal supine at an angle of 30°, with the head slightly extended. Appropriate bedding and methods should be used to maintain the child in the proper position (grade C).



Nasal decongestion

As infants mainly breathe through the nose, it is essential to keep the upper airway clear. There are no data supporting the instillation of any product other than saline.

Environment

Passive inhalation of tobacco smoke is a proven aggravating factor that could lead to hospitalisation (grade A). The child's bedroom should be well ventilated and the temperature should be maintained at or below 19°C (grade C).

- **Medication**

The drugs shown in Table 1 have no place in the management of a first episode of bronchiolitis. Antibiotics may be indicated if one or more of the following signs is present, suggesting possible superinfection or particular susceptibility:

- fever ≥ 38.5 °C for more than 48 hours
- acute otitis media
- underlying pulmonary or heart disease

- pulmonary lesions confirmed radiographically
- elevation of C-reactive protein (CRP) and/or polymorphonuclear neutrophils.

Table 1. Drugs NOT to be used in the management of a first episode of bronchiolitis

Drugs	Comment
Bronchodilators (epinephrine (adrenaline), theophylline, synthetic anticholinergics beta-2 agonists)	No French Marketing Authorisation for bronchiolitis; no indication (grade B)
Corticosteroids (systemic or inhaled)	Not shown to be effective in a first episode
Antiviral agents (ribavirin)	No indication
Antibiotics	Not indicated as a first-line treatment as they have no effect on the viral agents that cause bronchiolitis
Antitussives, mucolytics and expectorants	No indication

Oxygen therapy

Oxygen therapy is indicated in a hospital environment for acute infant bronchiolitis causing marked desaturation.

QUESTION 4 – What is the role of chest physiotherapy?

The indication for chest physiotherapy in acute bronchiolitis in infants is based on observation of a clear clinical improvement after its use, and is based on experts' opinion (grade C). The techniques used are the bronchial decongestion techniques recommended by the 1994 Lyon consensus conference (grade C) (see Box 4). Studies are needed to validate their use. In French-speaking European countries where chest physiotherapy is widely prescribed and recommended, the preferred techniques are mainly passive, slow expiration methods combined with directed cough.

The physiotherapist does not just carry out repetitive technical procedures, but has an important role in monitoring the infant and educating the family.

Box 4. Physiotherapy techniques

Upper airway clearance

- nasopharyngeal decongestion combined with local instillation of saline, which should be taught to the child's parents;
- nasopharyngeal aspiration using a catheter is an invasive procedure, which should be used only in critical situations, usually in a hospital setting.

Lower airway clearance

- slow, prolonged expiration, which includes slow increase in expiratory flow, which should be guided by auscultation;
- the directed cough technique, to promote expectoration

- **Practical aspects and prescription of physiotherapy; training**

Chest physiotherapy should not be prescribed routinely, but should depend on the child's clinical condition. Assessment of the efficacy and safety of the techniques should be based on the child's clinical condition, auscultation and a congestion score. The child's tolerance of physiotherapy should be assessed by skin colour, dyspnoea, retraction and fatigability during the procedure. The jury proposed that oximetry monitoring be developed (transcutaneous SaO₂).

The frequency and total number of sessions required depends on clinical progress, which should be reassessed at each session. There is no scientific evidence to support routine prescription of chest physiotherapy at home.

The jury emphasised the need to make the above techniques more widely known. General practitioners and paediatricians should be able to refer their patients to physiotherapists who have been specifically trained in these techniques.

All the recommendations with regard to physiotherapy are classed as grade C.

Question 5 – How should care be organised?

- **Current organisation of care**

In France, the health system copes badly with the annual bronchiolitis epidemic. Requests for hospital care mean that large numbers of patients crowd emergency departments. The main signs that the system is not working are the saturation of emergency services and an excessive number of interhospital transfers. Both inpatient and outpatient healthcare services respond only partially to the demands made of them.

- **How could the organisation of care be improved?**

Establishing an effective system requires a systemic analysis (i.e. analysis of the actions of the various parts of the system and the interactions between them), anticipating events and coherent organisation of healthcare services. The system needs to be centralised at regional level and should involve all interested parties in the healthcare system. It raises the question whether a network should be set up to include management of sick infants.

- *Outpatient care*: Restore doctors to their central place in the healthcare network by putting greater emphasis on outpatient monitoring, prevention and health education.
- *Hospital care*: Organise appropriate emergency and referral services (return to the outpatient system, very short stay beds, standard hospitalisation).

Each region has its own specific characteristics. The proposed system should take account of local requirements and capacities.

Question 6 – How can bronchiolitis be prevented?

Prevention has two goals:

- (i) reduce the incidence of bronchiolitis in infants by limiting transmission of the viruses that cause it
- (ii) delay the age of primary infection.

- **Standard measures common to family, outpatient and inpatient care**

The following standard measures are recommended:

- families and nursing staff should be taught simple hand washing with soap and water
- objects and surfaces in community premises should be disinfected every day.

The use of gloves has been shown to be effective when combined with hand washing, but has not been shown to be better than hand washing alone.

- **Within the family**

Education to reduce infection should include:

- basic healthcare about risks in the environment, breastfeeding, and education in nasal lavage
- simple rules of hygiene
- information on how the disease develops and the importance of having the child's condition assessed by a general practitioner before the child is taken to hospital.

Community childcare facilities should be avoided until the child is 6 months old. Extending maternity leave to 6 months should be considered. This measure would also encourage mothers to breastfeed for longer.

Prevention needs local policies to promote high-quality childcare in a family environment, and the development of financial aid to make this available to all.

- **Outpatient care structures**

The standard measures must be applied, i.e. hand-washing, disinfection of surfaces. Education aimed at families should be provided by medical and nursing staff, and supported by publicity campaigns in the media, with printed support materials.

- **Admission to hospital**

The following recommendations apply to epidemics:

- elective admissions should be kept to a minimum, and hospital stay duration reduced;
- all hospitals with a paediatrics department should draw up a "bronchiolitis plan";
- children with respiratory infections should be managed by a specialist team.

Isolation in individual rooms is not justified.

The following have yet to be assessed:

- the efficiency of grouping cases in the same area after a rapid RSV diagnostic test
- the benefit of wearing masks to prevent transmission between nursing/medical personnel and patients.

- **Prophylaxis**

Box 5. Limitations of prophylactic measures	
Antiviral agents	Anti-RSV monoclonal antibodies are limited to premature infants (born before 32 weeks gestational age) and to infants with bronchopulmonary dysplasia
RSV vaccines	None currently available
Inhaled corticosteroids	Do not prevent recurrence whilst recovering from a first episode of bronchiolitis

The effect of a single episode of bronchiolitis on the subsequent development of infantile asthma is not known. If such an effect were proven, studies on early anti-inflammatory therapy would be needed.

Conclusions

The jury decided to restrict its recommendations to the definition of bronchiolitis in infants aged 1-24 months at the time of the first episode of infection.

1. The jury reached a consensus on the recommendations concerning severity criteria and the criteria for hospitalisation (grade C). Assessment of these criteria would require establishing scores based on outpatient studies by a large cohort of practitioners from both hospital and non-hospital practice.
2. The recommendations for treatment are based on two main arguments:
 - (i) a high level of scientific evidence provided by published data: discontinuation of unvalidated drug therapies (grade B) and application of general measures (grade C);
 - (ii) agreement among professionals based on a consensus of practice: the importance of monitoring the infant. The jury emphasised the importance of daily monitoring and assessment of clinical symptoms. Chest physiotherapy is based on the bronchial decongestion techniques recommended by the 1994 Lyon consensus conference (grade C). For the treatment of bronchiolitis, the jury recommended the use of specific upper and lower airway decongestion techniques adapted for infants (grade C).
3. To improve measures to prevent the spread of bronchiolitis, the jury recommended delaying putting a child into childcare facilities until the age of 6 months, and emphasised the importance of avoiding passive smoking (grade B), hand-washing (grade A), and disinfection of infected surfaces and objects (grade B).
4. The jury recommended that care should be organised in the form of a network involving all the professionals concerned by the disease, i.e. medical and paramedical professionals, especially by providing training for professionals and education for the general public.

Finally, the jury recommended that the impact of the consensus conference be measured.

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