

Infants and children: Acute Management of Bronchiolitis second edition

CLINICAL PRACTICE GUIDELINES

VDA Net
Banca Dati Sanitaria Farmaceutica



NSW HEALTH

NSW MINISTRY OF HEALTH
73 Miller Street
North Sydney NSW 2060
Tel. (02) 9391 9000
Fax. (02) 9391 9101
www.health.nsw.gov.au

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For further copies of this document please contact:

The Better Health Centre
PO Box 672
NORTH RYDE 2113
Tel. (02) 9887 5450
Fax. (02) 9887 5452

Information Production and Distribution

Tel. 02) 9391 9186
Fax. (02) 9391 9580

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Contents

Introduction	2	Drugs	10
Changes from previous clinical practice guideline	3	Physiotherapy	11
Overview	4	ICU consultation	11
Diagnosis	4	Discharge criteria	11
Differential diagnosis	5	Prevention of cross-infection	11
Assessment and initial management of acute bronchiolitis	6	Smoking	11
Severity assessment	7	Breastfeeding	11
Course of illness	7	Complementary and alternative medicines	12
Mild bronchiolitis	7	Key points	12
Moderate bronchiolitis	7		
Severe bronchiolitis	7	Appendices	
Warning: High risk of serious illness	8	Appendix 1: Parent information sheet: Bronchiolitis	13
Treatment at home	8	Appendix 2: Evidence base of management of viral bronchiolitis	14
Tests	8	Appendix 3: Bronchiolitis clinical expert reference group	17
Oxygen administration	9		
Important nursing issues	9		
Fluid therapy	10		

Introduction

These Guidelines are aimed at achieving the best possible paediatric care in all parts of the State. The document should not be seen as a stringent set of rules to be applied without the clinical input and discretion of the managing professionals. Each patient should be individually evaluated and a decision made as to appropriate management in order to achieve the best clinical outcome.

Field, M.J. & Lohr, K.N. (1990) define clinical practice guidelines as:

‘systematically developed statements to **assist** practitioner and patient decisions about appropriate health care for specific clinical circumstances.’ (Field MJ, Lohr KN (Eds). Clinical Practice Guidelines: Directions for a New Program, Institute of Medicine, Washington, DC: National Academy Press)

It should be noted that this guideline reflects what is currently regarded as a safe and appropriate approach to care. However, as in any clinical situation there may be factors which cannot be covered by a single set of guidelines and therefore this document should be used as a guide rather than as an authoritative statement of procedures to be followed in respect

of each individual presentation. It does not replace the need for the application of clinical judgment to each individual presentation.

This document represents basic clinical practice guidelines for the acute management of bronchiolitis in infants and children. Further information may be required in practice; suitable widely available references are included in Appendix Two.

Each Local Health District is responsible for ensuring that local protocols based on these guidelines are developed. Local Health Districts are also responsible for ensuring that all staff treating paediatric patients are educated in the use of the locally developed paediatric guidelines and protocols.

In the interests of patient care it is critical that contemporaneous, accurate and complete documentation is maintained during the course of patient management from arrival to discharge.

Parental anxiety should not be discounted: it is often of significance even if the child does not appear especially unwell.

Changes from previous clinical practice guideline

The following outlines changes to the document:

- The severity of illness section now contains a short paragraph on the expected course of the illness.
- The assessment and initial management chart has been redeveloped to incorporate the severity assessment and the treatment of bronchiolitis.
- The overview has been reworked to incorporate an alert regarding “a toxic looking child”.
- The diagnosis of bronchiolitis is done by accurately assessing the disease severity based on history and physical examination.
- Reference to using N/4 dextrose saline has been removed from the guideline.
- Nasogastric feeding is now recommended for infants who are tiring or if their oral intake is poor.
- The bronchiolitis parent fact sheet has been taken out of this document and Appendix One now provides a link to it electronically.
- A short section on cigarette smoking has been incorporated into the document.
- A short section on breast feeding has been incorporated into the document.
- A short section on Complementary and Alternative Medicines has been incorporated in the document.

Overview

Viral bronchiolitis of infancy is a lower respiratory infection which produces small airway obstruction with air trapping and respiratory difficulty in infants mostly aged less than twelve months. Respiratory Syncytial Virus (RSV) is the most common cause but other viruses include metapneumovirus, rhinovirus and influenzae etc. Viral bronchiolitis is the most common severe respiratory infection of infancy. Nevertheless, it is usually a self-limiting condition, often requiring no treatment. For the minority of infants who require treatment, mainstays of good care include oxygen, adequate fluids, and careful observation to detect the few infants who will need major intervention. A major source of confusion over therapies, especially in older infants, arises from the fact that viral bronchiolitis can be hard to distinguish from asthma with associated viral respiratory infection.

A “toxic” infant who is drowsy, lethargic or irritable, pale, mottled with increased work of breathing and/or tachycardic requires immediate treatment. Careful evaluation for other causes of fever and respiratory distress should be undertaken before making a diagnosis of bronchiolitis.

Diagnosis

Viral bronchiolitis is a clinical diagnosis.

Most cases occur between late autumn and early spring, with sporadic cases any time.

Clinical features are quite variable and may include some or all of the following:

- nasal obstruction +/- rhinorrhoea and an irritating cough are usually noticed first
- after one to three days there follows increasing tachypnoea and respiratory distress. The chest is often overexpanded
- auscultatory signs are variable: fine inspiratory crackles are often heard early, becoming coarser during recovery; expiratory wheeze is often present, initially high-pitched, with prolonged expiration
- respiratory distress may be mild, moderate or severe
- fever of 38.5 degrees celcius or greater is seen in about 50% of infants with bronchiolitis

- apnoea may be the presenting feature, especially in very young, premature or low-birthweight infants. It often disappears, to be replaced by severe respiratory distress
- clinicians should diagnose bronchiolitis and assess disease severity on the basis of history and physical examination. It is usually not necessary to order confirmatory laboratory or radiological investigations
- diagnosis of bronchiolitis is clinical. Nasopharyngeal Aspirate (NPA) may help cohort arrangements

Differential diagnosis

A number of other conditions may share some presenting features with viral bronchiolitis. These conditions can usually be excluded via an accurate history, a thorough physical examination and, where indicated (see below), chest X-ray. Such conditions include:

- acute asthma, associated with viral lower respiratory infection
- pneumonia
- congestive heart failure
- pertussis
- pneumothorax
- bronchial foreign body

Assessment and initial management of acute bronchiolitis

Reconsider diagnosis if the child is >1 year, looks 'unwell', has high fever or responds poorly to treatment.

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Initial Severity Assessment			
Treat in the highest category in which any symptom occurs			
Symptoms	Mild	Moderate	Severe and Life Threatening
Appearance	Well	Mildly Unwell	Unwell
Respiratory Rate	Mild Tachypnoea	Moderate Tachypnoea	Apnoeas Severe Tachypnoea Greater than 70 Bradypnoea Less than 30
Work of Breathing	Normal	Mild to Moderate	Moderate to Severe Grunting
Cyanosis	No Cyanosis	No Cyanosis	May be Cyanosed or Pale
Oxygen Saturation Oxygen Requirement	Above 95% in Air	90- 95% in Air	Less than 90% in Air Less than 92% in O2
Heart Rate	Normal	Mild Tachycardia	Tachycardia greater than 180
Feeding	Normal or Slightly Decreased	Difficulty feeding but able to take more than 50% of normal feed.	Difficulty feeding taking less than 50% of normal feed.
		Contact paediatrician	Get senior help then Call NETS 1300 36 2500
Treatment			
Oxygen	No	Give O2 to maintain saturation at or above 95% and or to improve the work of breathing	Maintain oxygen saturations greater than 95% Ensure high inspired oxygen via high flow delivery device if required
Hydration	Recommend smaller more frequent feeds if required	Smaller more frequent feeds Consider NG feeds	IV fluids and NBM
Investigations	Nil required	Nil required	Consider – CXR and Blood Gas / BSL
Observation & Review	hourly	Continuous SaO2 monitoring Minimum hourly observation	Continuous cardio respiratory and SaO2 monitoring Constant observation
No or Poor response to Treatment		Check diagnosis Escalate treatment	Get Senior Help Consult PICU via NETS Consider CPAP May need intubation
Disposition	Likely to go home	Likely to admit Decisions around hospitalisation of infants with SaO2 between 92 & 95 % should be supported by clinical assessment, phase of the illness & social & geographical factors	Transfer to an appropriate paediatric unit via NETS If in a children's hospital, may need PICU.

Severity assessment

Course of illness

Apnoea may be an early feature in young infants. Bronchiolitis usually worsens over the first several days of the illness. Infants presenting with mild or moderate respiratory distress may deteriorate over the next few days. Decisions about admission and follow up need to recognise the likelihood of deterioration. Difficulty in breathing, a wheeze and poor feeding can last six to seven days. The cough usually lasts another week or two. Some infants may take four weeks to fully recover.

Mild bronchiolitis

Manage at home if appropriate

- normal ability to feed
- little or no respiratory distress
- no requirement for oxygen therapy – ie oxygen saturation above 95% in room air
- consider admission if high risk factors are present

Moderate bronchiolitis

Admit to hospital; involve a paediatrician

- increased work of breathing during feeding, feeds may be decreased but total intake is more than 50% of normal
- mild to moderate respiratory distress, with some chest wall retractions, nasal flaring
- 90 to 95% oxygen saturation in room air

Severe bronchiolitis

Will usually require transfer to a tertiary paediatric intensive care unit

- may be reluctant or unable to feed with intake less than 50% of normal. Feeding may worsen the coughing and increase the work of breathing and tachycardia
- moderate to severe respiratory distress, with marked chest wall retractions, nasal flaring and grunting
- may have apnoeic episodes

- normal, slow heart or respiratory rate in unwell children may indicate actual/imminent decompensation
- oxygen saturation less than 90% in air, or less than 92% with appropriate oxygen therapy
- may appear increasingly tired

Warning: high risk of serious illness

Infants in these groups are at increased risk of rapid deterioration and are more likely to need extra oxygen and ventilatory assistance; consider hospital admission even if assessed as mild

- full-term infants up to about three months of age
- infants who are premature or of low-weight for gestational age
- infants with chronic lung disease eg bronchopulmonary dysplasia (BPD), congenital lung abnormalities
- infants with congenital heart disease, especially with L→R shunt

Treatment at home

This is often possible and preferable, with mild bronchiolitis. Requirements include:

- appropriately informed, competent parent/s who can recognise signs of deterioration
- out-of-hours access to help, telephone and transport

- an involved general practitioner
- provide parents with bronchiolitis fact sheet

Tests

The diagnosis of bronchiolitis is clinical and routine testing is not required.

However,

- virological testing may be used in infants who require admission with acute bronchiolitis, in order to guide cohort arrangements
- chest x-ray is not recommended for uncomplicated acute bronchiolitis but has a place when there is diagnostic uncertainty or an unusual disease course
- infants who are toxic require further investigation to exclude other infections. Consider full blood count, urine - microscopy and culture, blood culture, chest x-ray and cerebrospinal fluid studies.
- electrolytes if requiring intravenous fluids
- blood gases – consider in severe disease

NB: Blood glucose should be assessed in all sick patients.

Oxygen administration

In the acute phase supplemental oxygen should be given if oxygen saturations fall persistently below 95%.

Oxygen should also be given to infants who show signs of:

- hypoxia (restlessness, agitation or drowsiness)
- increased work of breathing
- increasing fatigue or tiring with feeds

Oxygen (where possible use humidified oxygen to prevent dryness and excoriation of the nares) may be given via:

- nasal prongs - maximum flow rate 2 litres per minute
- simple facemask (flow rate 6 to 8 litres per minute)
- head box (flow \geq 10 litres per minute)
- warmed humidified high flow nasal cannula (whnc) therapy (should be used in consultation with a Paediatrician and localised guidelines)
- during the recovery phase, saturations 92% or above (in room air) are acceptable if the infant is not demonstrating clinical respiratory distress and is feeding well

Persisting hypoxaemia, frequent apnoea or severe respiratory distress, despite high oxygen flow, requires urgent medical assessment and possible referral to tertiary services viz. Paediatric Intensive Care Unit (direct or via NETS)

Important nursing issues

Clinical staff need to be able to recognise any deterioration in condition and respond appropriately when caring for infants with bronchiolitis.

Signs of deterioration include:

- increased work of breathing – subcostal or intercostal recession tracheal tug, increased respiratory rate
- increasing fatigue
- increasing difficulty with feeding
- apnoea
- central cyanosis (very late sign)

Nursing management

- continuous respiratory rate, heart rate and pulse oximetry monitoring is required
- supplemental oxygen as required
- caution with feeding – offer small frequent feeds if tolerating oral, otherwise may require nasogastric feeds or intravenous therapy depending upon severity of illness

- minimal handling and impact of procedures
 - wherever possible, nurses caring for infants with moderate or severe bronchiolitis should have paediatric skills and knowledge
 - there is no evidence to confirm the value of nasal toilet in infants suffering from nasal obstruction in association with bronchiolitis but, anecdotally, some have found it helpful. In inexperienced hands, the procedure may be dangerous, increasing the difficulty in breathing rather than reducing it. Therefore, only 0.1-0.2 mL of normal saline should be administered to one nostril at a time and any gentle suction should be restricted to the anterior of the nares, with the child in a semi-recumbent position.
 - strict adherence to infection control such as hand decontamination, personal protective equipment and isolation or cohorting should be maintained
 - provide education and support to parents and carers – offer fact sheets when appropriate
- nasogastric feeding is recommended for infants who are tiring with feeding or if oral intake is poor
 - intravenous fluids are required if the infant is unable to tolerate oral or nasogastric fluids and should be considered in infants with moderate to severe bronchiolitis

Drugs

- in general, don't use bronchodilators in infants less than six months
- if asthma is considered a possibility, in infants aged six to twelve months, order a standard stat dose, (eg salbutamol via a nebuliser or via a metered dose aerosol with spacer device), watch it being given, assess and record the effects before deciding whether to order more
- don't use corticosteroids or ipratropium bromide, except in older infants, when asthma is considered a substantial possibility, or in infants with chronic neonatal lung disease
- generally don't use antibiotics, but consider them in the most unwell infants, especially those with significant chest X-ray changes, high fever and/or toxicity
- don't use antiviral drugs (eg ribavirin)
- immunoprophylactic medications may decrease hospitalisation rates in some infants but evidence is equivocal. It should be considered on an individual basis in infants considered to be at high risk

Fluid therapy

- infants require frequent and careful assessment of their hydration status and ability to take oral fluids
- oral feeding should continue while tolerated in infants with mild to moderate respiratory distress

Physiotherapy

Chest physiotherapy is not usually of any help.

ICU consultation

Consider ICU consultation if there is:

- progression to severe respiratory distress, especially in at-risk group
- any significant apnoeic episodes eg associated with desaturation, or > 15 seconds, or frequent recurrent brief episodes
- persistent desaturation despite oxygen
- evidence of respiratory failure on blood gases

Discharge criteria

- minimal respiratory distress, feeding well
- during the recovery phase, saturations 92% or above (in room air) are acceptable if the infant is not demonstrating clinical respiratory distress and is feeding well
- infants with chronic lung disease, heart disease, or other risk factors should be discussed individually with consultant
- provide education, support and follow-up arrangements to parents and carers

Prevention of cross-infection

- cross-infection is common, serious and largely preventable
- respiratory viruses are spread by nose / face → hands → hands or face of another individual
- hand decontamination is the most important step in preventing nosocomial spread. Hands should be decontaminated before and after direct contact with patients, after contact with inanimate objects in the direct vicinity of the patient, and after removing gloves.
- clinicians should educate staff and family members on hand sanitation
- avoid nursing infants with bronchiolitis in rooms with high risk infants

Smoking

- infants should not be exposed to passive smoking
- provide practical information to parents to assist them to stop smoking

Breastfeeding

- babies who are breast fed have a lower risk of many types of illness

Complementary and alternative medicines

There are no studies to demonstrate the benefits of complementary or alternative therapies in bronchiolitis.

Key points

- Oxygen (preferably warmed and humidified) is the most important treatment.
- Careful and repeated observation by experienced nurses is crucial.
- Generally, bronchodilators should not be used in infants less than six months old.
- Corticosteroids should not be used unless asthma is likely.
- Antibiotics are not routinely used.
- Take special care with infants at risk of severe illness.
- Adequate fluid intake must be maintained.

Appendix one – Parent information sheet: Bronchiolitis

A Bronchiolitis Fact Sheet was jointly developed by the The Children’s Hospital at Westmead, Sydney Children’s Hospital and Kaleidoscope Hunter Children’s Health Network in 2009.

The Bronchiolitis Fact Sheet is available at:

www.chw.edu.au/parents/factsheets

www.sch.edu.au/health/factsheets

www.kaleidoscope.org.au/parents/factsheets.htm

This document was reviewed on 23rd December 2009.

Disclaimer: This fact sheet is for educational purposes only. Please consult with your doctor or other health professional to make sure this information is right for your child.

Appendix two – Evidence base of management of viral bronchiolitis

In the management of viral bronchiolitis of infancy:

- supplemental oxygen is the single most useful therapy
- special care with feeding and minimal interference are often required with more unwell infants
- careful observation is necessary with high-risk and more unwell infants, to facilitate optimal use of ventilatory support in the small number of infants who will need it

All the above are supported more by “first principles” and common sense, than by published evidence. Most published evidence relates to the use of drugs especially bronchodilators and corticosteroids, given in an attempt to modify the course of bronchiolitis. Such agents are widely used more often in North America than Australia, despite a lack of evidence of benefit - as set out below.

Much of the confusion over bronchodilators and corticosteroids in bronchiolitis relates to the fact that bronchiolitis and asthma may produce similar clinical features especially in infants aged over six months.

The following references include reviews of the evidence base of therapies in acute viral bronchiolitis:

Bronchiolitis in children. Scottish Intercollegiate Guidelines Network. November 2006. www.sign.ac.uk.

Diagnosis and management of Bronchiolitis. American Academy of Pediatric. *Pediatrics* 2006; 118 (4): 1774-1793.

Other references:

Antibiotics

Bronchiolitis is a viral disease and antibiotic therapy is not recommended. Infective agents include respiratory syncytial virus, metapneumovirus, rhinovirus, influenza, parainfluenza and adenovirus.

Brodzinski H, Ruddy R. Review of new and newly discovered respiratory viruses in children. *Pediatric Emerg Care*. 2009. 25(5):352-360

Paranhos-Baccala G, Komurian-Pradel F, Richard N, Vernet G, Lina B, Floret D. Mixed respiratory viral infections. *J Clin Virol* 2008.43(4):407-10

Bronchodilators

Bronchodilators, including beta-2 agonists and adrenaline have not been demonstrated to be of consistent usefulness but may be appropriate in certain infants if there has been an established (measured and recorded) response.

Kellner JD, Ohlsson A, Gadomski AM, Wang EE. Bronchodilators for bronchiolitis Cochrane Database Syst Rev 2000;(2):CD001266.Review. Update in: Cochrane Database Syst Rev 2006;3:CD001266).

King VJ, Viswanathan M, Bordley WC, Jackman AM, Sutton SF, Lohr KN, Carey TS. Pharmacologic treatment of bronchiolitis in infants and children: a systematic review Arch Pediatr Adolesc Med 2004;158(2):127-137

Ipratropium bromide has not been shown to be useful in bronchiolitis:

Everard ML;Kurian M;Elliott TM;Ducharme F; Mayo WV Anticholinergic drugs for wheeze in children in under 2 years. Cochrane Database Sys Rev 2005;(3):CD001279).

Corticosteroids

Multiple studies have failed to demonstrate efficacy of corticosteroids in viral bronchiolitis. A meta-analysis of corticosteroids in bronchiolitis failed to show sufficient benefit to change current

accepted practice ie that corticosteroids should not be routine therapy in viral bronchiolitis:

Patel H, Platt R, Lozano JM, Wang EEL. Glucocorticoids for acute viral bronchiolitis in infants and young children. The Cochrane Library, 2004:Cochrane Database;2004 Syst Rev; 3;CD004878.Updated in Cochrane Syst Rev. 2008;(1):CD004878

Ribavirin

The use of ribavirin, an antiviral agent with activity against RSV, is not supported by evidence of significant benefit. Moreover, it is accompanied by major practical problems in administration, occupational health and safety concerns and great expense.

Randolph AG, Wang EEL. Riboviran for respiratory syncytial virus infection of the lower respiratory tract. Cochrane Database Syst Rev 200;2:CD000181.Review update in:Cochrane Database Syst Rev 2004;4:CD00181.

RSV prophylaxis

RSV immunoglobulin (Respigam) and monoclonal RSV immunoglobulin (Palivizumab, Synagis) have been advocated to reduce the frequency and severity of bronchiolitis, especially in high-risk infants. There is concern about the safety of the former drug in infants with congenital heart disease, and neither drug has been generally considered to be cost-effective. Nevertheless, more recent analysis has suggested palivizumab may be cost effective in selected high risk infants.

Rietveld E, Steyerbeg EW, Polder J, et al Passive immunisation against respiratory syncytial virus: a cost-effectiveness analysis *Arch Dis Child* 2010;95 (7):493/8.

Field, M.J. & Lohr, K.N. (eds) (1990) *Clinical Practice Guidelines: directions for a new program*, Institute of Medicine, National Academy Press, Washington, DC.

Co-incident infections

The risk of bacteraemia or meningitis in children < 90 days with fever and bronchiolitis is low. Cross section study found that 6.5% of febrile infants up to 60 days old with bronchiolitis had a urinary tract infection.

Melendez E, Harper MB. *Utility of sepsis evaluation in infants 90 days of age or younger with fever and clinical bronchiolitis*. *Pediatric Infect Dis*. 2003;22 (12):1053-1056.

Levine DA, Plat DL; Dayan PS et al Risk of serious bacterial infection in young febrile infants with respiratory syncytial virus infections. *Pediatrics* 2004; 113 (6 part1):1728-34.

Appendix three – Bronchiolitis clinical expert reference group

Professor John Whitehall	Foundation Chair, Paediatrics & Child Health University of Western Sydney (Chair)
Ms Karyn Fahy	Western Child Health Network Coordinator CHW (Secretariat)
Professor Peter Van Asperen	Head Department of Respiratory Medicine CHW
Dr Sarah Dalton	Staff Specialist Paediatric Newborn Emergency Transport Service
Dr Jodi Hilton	Paediatric Respiratory and Sleep Physician JHCH
Dr Jason Hort	Senior Staff Specialist CHW
Dr Tim McCrossin	Senior Staff Specialist Paediatrics Bathurst Base Hospital
Dr Matthew O'Meara	Emergency Department Director SCH
Ms Debbie Andrews	Transitional Paediatric Nurse Practitioner Mt Druitt/Blacktown Hospital
Ms Linda Cheese	Paediatric and Respiratory and Cystic Fibrosis Clinical Nurse Consultant JHCH
Ms Mia Chong	Paediatric Clinical Nurse Consultant South Western Sydney Local Health District
Mr Audas Grant	Clinical Nurse Consultant Emergency/Critical Care Southern NSW Local Health District
Ms Nicola McKay	Paediatric Clinical Nurse Consultant Western Sydney Local Health District (Central and Eastern Cluster)

Ms Karen Rankin	Clinical Nurse Consultant CHW
Mr Tomas Ratoni	Paediatric Clinical Nurse Consultant Northern NSW Local Health District
Ms Helen Stevens	Paediatric Clinical Nurse Consultant Hunter New England Local Health District (Northern Region)
Ms Amanda Thomsen	Clinical Nurse Consultant Respiratory SCH

CHW = The Children’s Hospital at Westmead

JHCH = John Hunter Children’s Hospital

SCH = Sydney Children’s Hospital at Randwick

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