Infants and Children - Acute Management of Bronchiolitis

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Clinical/ Patient Services - Medical Treatment
Summary  Clinical Practice Guidelines for the acute treatment of infants and children with bronchiolitis
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Applies to  Local Health Districts, Specialty Network Governed Statutory Health Corporations, Affiliated Health Organisations, Community Health Centres, NSW Ambulance Service, Public Hospitals
Audience  Emergency Departments, Paediatric Units
Distributed to  Public Health System, Divisions of General Practice, Government Medical Officers, NSW Ambulance Service, Ministry of Health, Private Hospitals and Day Procedure Centres, Tertiary Education Institutes
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Director-General

This Policy Directive may be varied, withdrawn or replaced at any time. Compliance with this directive is mandatory for NSW Health and is a condition of subsidy for public health organisations.
INFANTS AND CHILDREN: ACUTE MANAGEMENT OF BRONCHIOLITIS

PURPOSE

The *infants and children: acute management of bronchiolitis* clinical practice guideline (attached) has been developed to provide direction to clinicians and is aimed at achieving the best possible paediatric care in all parts of the state.

The clinical practice guideline was prepared for the NSW Ministry of Health by an expert clinical reference group under the auspice of the state wide Paediatric Clinical Practice Guideline Steering Group.

MANDATORY REQUIREMENTS

This policy applies to all facilities where paediatric patients are managed. It requires all Health Services to have local guidelines / protocols based on the attached clinical practice guideline in place in all hospitals and facilities likely to be required to assess or manage paediatric patients with bronchiolitis.

The clinical practice guideline reflects what is currently regarded as a safe and appropriate approach to the acute management of bronchiolitis in infants and children. However, as in any clinical situation there may be factors which cannot be covered by a single set of guidelines. This document should be used as a guide, rather than as a complete authoritative statement of procedures to be followed in respect of each individual presentation. *It does not replace the need for the application of clinical judgement to each individual presentation.*

IMPLEMENTATION

Chief Executives must ensure:

- Local protocols are developed based on the *infants and children: acute management of bronchiolitis* clinical practice guideline.
- Local protocols are in place in all hospitals and facilities likely to be required to assess or manage paediatric patients with bronchiolitis.
- Ensure that all staff treating paediatric patients are educated in the use of the locally developed paediatric protocols.

Directors of Clinical Governance are required to inform relevant clinical staff treating paediatric patients of the revised protocols.

REVISION HISTORY

<table>
<thead>
<tr>
<th>Version</th>
<th>Approved by</th>
<th>Amendment notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>January 2005 (PD2005_387)</td>
<td>Director-General</td>
<td>New policy</td>
</tr>
</tbody>
</table>

ATTACHMENT

1. Infants and Children: Acute Management of Bronchiolitis – Clinical Practice Guideline.
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.’


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.
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 +/− rhinorrhea 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.

<table>
<thead>
<tr>
<th>Initial Severity Assessment</th>
<th>Treat in the highest category in which any symptom occurs</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Symptoms</strong></td>
<td><strong>Mild</strong></td>
</tr>
<tr>
<td>Appearance</td>
<td>Well</td>
</tr>
<tr>
<td>Respiratory Rate</td>
<td>Mild Tachypnoea</td>
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<td></td>
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<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Work of Breathing</td>
<td>Normal</td>
</tr>
<tr>
<td>Cyanosis</td>
<td>No Cyanosis</td>
</tr>
<tr>
<td>Oxygen Saturation Oxygen Requirement</td>
<td>Above 95% in Air</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Heart Rate</td>
<td>Normal</td>
</tr>
<tr>
<td>Feeding</td>
<td>Normal or Slightly Decreased</td>
</tr>
<tr>
<td>Treatment</td>
<td></td>
</tr>
<tr>
<td>Oxygen</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Hydration</td>
<td>Recommend smaller more frequent feeds if required</td>
</tr>
<tr>
<td>Investigations</td>
<td>Nil required</td>
</tr>
<tr>
<td>Observation &amp; Review</td>
<td>hourly</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>No or Poor response to Treatment</td>
<td>Check diagnosis Escalate treatment</td>
</tr>
<tr>
<td>Disposition</td>
<td>Likely to go home</td>
</tr>
</tbody>
</table>

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

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 ≥ 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

Oxygen administration

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
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.
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


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:


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.

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.


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:


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.

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.


Co- incidental 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.

## Appendix three – Bronchiolitis clinical expert reference group

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