Clinical Guideline

Management of Bronchiolitis in Children

Policy developed by: SA Child Health Clinical Network
Approved by SA Health Safety & Strategic Governance Committee on: 1 July 2013
Next review due: 31 May 2016

Summary
The Management of Bronchiolitis in Children Clinical Guideline is primarily aimed at medical staff working in any of primary care, local, regional, general or tertiary hospitals, however may be utilised or guide the care provided by other clinicians such as nurses. The information is current at the time of publication and provides a minimum standard for the assessment (including investigations) and management of bronchiolitis; it does not replace or remove clinical judgement or the professional care and duty necessary for each specific case.

Keywords
Cough, infection, atelectasis, respiratory tract, oxygenation, airway, obstruction, clinical guideline

Policy history
Is this a new policy? Y
Does this policy amend or update an existing policy? Y
Does this policy replace an existing policy? Y
If so, which policies?
Management of Bronchiolitis in Children, WCH Guideline

Applies to
All Health Networks
CALHN, SALHN, NALHN, CHSALHN, WCHN, SAAS

Staff impact
All Clinical, Medical, Nursing, Allied Health, Emergency, Dental, Mental Health, Pathology

PDS reference
CG091

Version control and change history

<table>
<thead>
<tr>
<th>Version</th>
<th>Date from</th>
<th>Date to</th>
<th>Amendment</th>
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<tr>
<td>1.0</td>
<td>24/01/2012</td>
<td>current</td>
<td>Original version</td>
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Disclaimer

The South Australian Paediatric Clinical Guidelines have been prepared to promote and facilitate standardisation and consistency of practice, using a multidisciplinary approach.

Information in this guideline is current at the time of publication.

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Although the clinical material offered in this guideline provides a minimum standard it does not replace or remove clinical judgement or the professional care and duty necessary for each specific patient case. Where care deviates from that indicated in the guideline contemporaneous documentation with explanation should be provided.

This guideline does not address all the elements of guideline practice and assumes that the individual clinicians are responsible to:

- Discuss care with consumers in an environment that is culturally appropriate and which enables respectful confidential discussion. This includes the use of interpreter services where necessary,
- Advise consumers of their choice and ensure informed consent is obtained,
- Provide care within scope of practice, meet all legislative requirements and maintain standards of professional conduct and
- Document all care in accordance with mandatory and local requirements.

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Management summary for bronchiolitis

<table>
<thead>
<tr>
<th>MILD</th>
<th>MODERATE</th>
<th>SEVERE</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Can be discharged home</td>
<td>• Admit</td>
<td>• Admit</td>
</tr>
<tr>
<td>(consider admission if</td>
<td>• Administer oxygen to maintain SaO₂ ≥93%</td>
<td>• Administer oxygen to maintain SaO₂ ≥93%</td>
</tr>
<tr>
<td>&lt;3 months)</td>
<td>• If not feeding adequately</td>
<td>• Continuous cardio-respiratory monitoring</td>
</tr>
<tr>
<td>• Advise parents of</td>
<td>consider:</td>
<td>• Seek senior help or advice (e.g. MET Call,</td>
</tr>
<tr>
<td>expected course of illness</td>
<td>- IV fluids</td>
<td>PICU, MedStar Kids 13STAR (137827)</td>
</tr>
<tr>
<td>• Smaller, more frequent</td>
<td>- nasogastric feeds</td>
<td>• Cease feeds and commence IVT</td>
</tr>
<tr>
<td>feeds</td>
<td>- comfort only feeds</td>
<td>• Consider nasogastric tube on free drainage</td>
</tr>
<tr>
<td>• GP follow up</td>
<td>• Consider 3% hypertonic saline nebulisations</td>
<td></td>
</tr>
<tr>
<td>• Parent information leaflet</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Return if condition</td>
<td></td>
<td></td>
</tr>
<tr>
<td>deteriorates</td>
<td></td>
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</tr>
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</table>
Important points

- Bronchiolitis is a clinical diagnosis.
- Bronchiolitis is a self-limiting condition, but it can be life threatening in the very young, especially ex-premature babies, and those with underlying disease.
- Management is supportive only. There is no disease modifying treatment.

Introduction

- Bronchiolitis is a viral lower respiratory tract infection, generally affecting children under 12 months of age.
- It is the most frequent cause of hospitalisation in infants under 6 months of age.
- The commonest aetiological agent is respiratory syncytial virus (RSV) although other viruses may be responsible.
- Infection results in widespread small-airway obstruction due to oedema and mucous plugging. This causes air trapping and atelectasis leading to inadequate oxygenation of pulmonary blood flow through VQ mismatching.
- Infants present with cough, tachypnoea, wheeze, crackles, poor feeding, hyperinflation, chest wall retraction and apnoea.
- The typical course of illness is coryzal symptoms followed by progressively worsening respiratory distress, often with deterioration overnight and mild improvement during the day. This is associated with worsening feeding and a dry cough. Following the peak of the illness, the respiratory distress resolves over several days but the cough may last for several weeks.

Assessment

History

- Include the following when taking the history for a child with suspected bronchiolitis:
  - Age - there is a higher risk of severe bronchiolitis if patient is less than 6 weeks of age.
  - Duration and progression of symptoms. Peak severity is typically day 2 - 3 from the onset of wheeze or 4-5 days from the start of the illness. This will determine whether or not the child is expected to get worse before they get better.
  - Presence of apnoeas. Describe number, frequency and duration.
  - Colour change.
  - Feeding. Is the child able to suck on bottle or breast? What is the duration and volume of feeding i.e. is the child taking longer to feed than normal? Are there fewer wet nappies?
  - Previous episodes of bronchiolitis. Frequent episodes or persistent symptoms especially from birth may suggest alternative diagnoses.
  - Family history of atopy or asthma. In an older infant this may suggest asthma and a trial of bronchodilators may be appropriate.
  - Does the child have pre-existing conditions including:
    - Premature birth
    - Chronic respiratory conditions
    - Neurological conditions
    - Congenital heart disease
    - Immunodeficiency

Examination

- General appearance and basic observations:
  - Temperature, respiratory rate, heart rate, saturations, +/- blood pressure
  - Colour
- Behavioural status
  - Irritability
  - Exhausted infant may be hypoxic and at risk of developing respiratory failure
- Hydration:
- Skin turgor, capillary refill, peripheral circulation, mucous membranes, fontanelle

- **Respiratory examination:**
  - Effort of breathing - use of accessory muscles, nasal flaring, colour, oxygen saturation
  - Recession – extent and sites of recession
  - Auscultation - typically diffuse end expiratory crackles and/or wheeze. Wheeze may be absent in young infants, especially under 4 months. In these infants prolongation of expiratory phase can be a useful sign
  - Periodic breathing or apnoeas
  - Oxygen saturation

- **Feeding**
  - Monitor SaO₂ while feeding, duration of feed and feed volume

  **Consider** pneumonia if fever present or toxic appearance

  **Consider** other diagnosis such as heart failure, asthma, bronchial foreign body, or pertussis

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**Assessment of Severity**

<table>
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<tr>
<th></th>
<th>MILD</th>
<th>MODERATE</th>
<th>SEVERE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Behaviour</strong></td>
<td>Normal</td>
<td>Some or intermittent irritability</td>
<td>Increasing irritability and/or lethargy</td>
</tr>
<tr>
<td><strong>Respiratory Rate</strong></td>
<td>Normal</td>
<td>Increased</td>
<td>Marked increase or decrease (in exhaustion)</td>
</tr>
<tr>
<td><strong>Accessory Muscle Use and Recession (Chest wall retraction)</strong></td>
<td>None or minimal</td>
<td>Mild tracheal tug Mild nasal flaring Moderate chest wall retraction</td>
<td>Marked tracheal tug Marked nasal flaring Marked chest wall retraction</td>
</tr>
<tr>
<td><strong>Feeding</strong></td>
<td>Normal</td>
<td>May have difficulty with or reduced feeding</td>
<td>Reluctant or unable to feed</td>
</tr>
<tr>
<td><strong>Oxygen</strong></td>
<td>No oxygen requirement <em>(SaO₂ &gt; 93%)</em></td>
<td>Mild hypoxia corrected by oxygen <em>(SaO₂ 90 - 93%)</em></td>
<td>Hypoxia, may not be corrected by oxygen <em>(SaO₂ &lt; 90%)</em></td>
</tr>
<tr>
<td><strong>Apnoeic episodes</strong></td>
<td>None</td>
<td>May have brief apnoeas</td>
<td>May have increasingly frequent or prolonged apnoeas</td>
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**Investigations**

In most children with bronchiolitis **no investigations** are required

- Serum electrolytes
  - **Required** if child is on intravenous fluids

- Chest x-ray
  - **NOT routinely required** unless diagnostic uncertainty e.g. symptoms and signs that may suggest an alternative diagnosis such as pneumonia or congestive heart failure
  - In bronchiolitis chest x-ray typically demonstrates hyperinflation, peribronchial thickening, and often patchy areas of consolidation and collapse.
• Blood cultures
  o **NOT required** unless bacterial infection suspected

• Blood gas
  o **NOT routinely required**

• Nasopharyngeal aspirate (NPA)
  o **NOT routinely required** for children with typical clinical picture of bronchiolitis as is has no diagnostic role
  o NPA is used in hospitalised children for infection control purposes
  o Medical indications include: history of apnoeas, severe or atypical illness, clinical suspicion of pertussis or Mycoplasma infection

Management

Management summary
Refer to page 3.

Discharge from emergency or primary care

- Mild degree of severity
- Patient can maintain adequate hydration on oral feeds
- Patient can maintain adequate oxygenation (SaO2 ≥ 93%) in room air
- Parents are competent to identify deterioration, to attend to the needs of the recovering infant and are able to return if necessary
- If this is a recurrent presentation, consider admission
- Infants under 3 months are at higher risk, especially of apnoeas, and admission should be strongly considered

Inpatient management

**Regular observations including:**

- Behaviour - alert, lethargic, irritable
- Heart rate
- Respiratory rate
- Work of breathing
- Pulse oximetry & oxygen requirement
- Any apnoeic episodes. If present, continuous pulse oximetry monitoring is indicated
- Temperature

- Observations should usually be done at least 4 hourly but more frequently in severely affected and younger infants.
- Cardio-respiratory and continuous oximetry monitoring should be considered in sicker and younger infants.
- Referral to Physiotherapy in cases with prolonged recovery oxygen or atelectasis.
- Minimal handling is recommended to prevent exhaustion particularly for those children with severe severity.
Infection Control

- The viruses that cause bronchiolitis are droplet and contact spread. Appropriate infection control and isolation measures should be taken.

Fluid requirements

Some infants may be dehydrated due to poor feeding prior to presentation. Recommendations below are for maintenance fluids and additional fluid may be needed in dehydrated infants.

Oral Feeds

- Oral feeding should be continued if tolerated
- Small frequent feeds are generally better tolerated
- Consider using intranasal 09% sodium chloride drops (0.2-0.4ml) or nasal spray to moisten and help remove secretions and/or suctioning prior to feeding

Note: Discontinue oral fluids in the event of significant respiratory distress, increasing tachypnoea (RR >80), apnoeic episodes, visible tiring or increased coughing or distress during feeds.

Nasogastric feeds

- Consider nasogastric feeds if infant unable to tolerate oral feeding but not severely unwell. There is a risk of aspiration in severe illness.
- Nasogastric feeds can be given as regular boluses (e.g. 2-4 hourly) or continuous feeds – there is no current evidence suggesting the benefit of continuous versus bolus feeds.
- If the child is breastfed and requires nasogastric feeding the first choice of fluid should be expressed breast milk.
- Consider limiting amount of nasogastric feeding to 2/3 maintenance.

Intravenous fluids

- Intravenous therapy is required for patients with severe bronchiolitis or if not tolerating oral/NG feeds.
- Restrict fluids to 75% of maintenance due to the risk of syndrome of inappropriate antidiuretic hormone (SIADH).
- Check electrolytes when commencing IVT.
- Initial fluid choice should usually be 0.45% sodium chloride + 5% glucose or 0.9% sodium chloride + 5% glucose.

Comfort feeds refer to small feeds (often 10-20ml) for children on IVT which settles their hunger. They should be given with caution in severe illness.

Oxygen

Provide oxygen to maintain SaO₂ ≥93% in a normally healthy infant (be mindful of infants with underlying medical conditions which may change their baseline oxygen requirements).

Deliver oxygen therapy via:

Nasal prongs

- Indicated in patients with mild to moderate work of breathing and SaO₂ < 93%.
- Maximum flow rate for infants and small children should be 2L/min.
Humidified High Flow Intranasal oxygen (Optiflow)
- There may be some benefit for children with severe illness in using humidified high flow
  intranasal oxygen if available. Local protocols regarding its use should be followed
- This may be used as an interim measure while awaiting retrieval

Weaning oxygen
Consider weaning oxygen if the child is:
- Clinically stable in current level of oxygen
- Maintaining SaO₂ > 93%
- Tolerating oral fluids
- Reduce oxygen according to patient’s clinical status and SaO₂

Medication

Bronchodilators
- Consider trial of bronchodilators in child > 6 months age. It is more likely to succeed if:
  - History of atopy in child (e.g. eczema) or a family history of atopy
  - Previous response to bronchodilators
- Give 6 puffs of Salbutamol MDI (100mcg per puff) via spacer. Check response 10 - 20 minutes
  later. This assessment should be performed by the doctor who initially assessed the child in
  order to determine whether or not there is a response to Salbutamol
- IF there is a positive response - consider charting regular Salbutamol
- Do NOT continue bronchodilators if there is no response to initial trial

Nebulised 3% hypertonic saline
- Hypertonic saline (3%) has been shown to decrease the length of stay in hospital in infants with
  Bronchiolitis
- Consider use of nebulised hypertonic saline as per attached protocol

Steroids
- There is no evidence for the use of steroids in Bronchiolitis

ICU consultation/admission/retrieval is indicated for:
- Severe respiratory distress
- Frequent or prolonged apnoeic episodes
- Patient requires more than 50% O₂ to maintain SaO₂ > 93%

Discharge criteria
- Patient can maintain adequate hydration on oral feeds
- Patient can maintain adequate oxygenation (SaO₂ ≥ 93%) in room air
- No suctioning required for > 8 hours
- Minimal work of breathing/recession
- Patient should be observed for at least 4 - 6 hours following cessation of oxygen
- The patient’s social circumstances need to be considered including the ability of parents to attend to the
  needs of the recovering infant

Follow-up
Uncomplicated cases of Bronchiolitis don’t require specific follow up but parents should contact their child’s
General Practitioner (GP) if they have concerns.
References

1. Zorc et al; Bronchiolitis: Recent Evidence on Diagnosis and Management: Paediatrics 2010: 125, 342-349

This guideline is based on the review of a number of current clinical guidelines including:

1. The Royal Children’s Hospital Melbourne Guidelines – Bronchiolitis Guideline
2. Starship Paediatric Health Clinical Practice Guidelines – Bronchiolitis Guideline
3. NSW Health – Children and Infant's with Bronchiolitis – Acute Management – 2005
4. Sydney Children’s Hospital – Viral Bronchiolitis Inpatient Guidelines

Information for parents

Parenting and Child Health. Women’s and Children’s Health Network. Available at URL:
Appendix 1- Use of 3% hypertonic saline in bronchiolitis

Preparation

➢ All final solutions must be freshly prepared. If available use diluted sodium chloride 6% for inhalation. If not available use diluted 20% sodium chloride.

➢ To prepare a 3% solution of sodium chloride for nebulisation:
  o Perform hand hygiene preferably with an alcohol based rub
  o Start with a newly opened solution of 6% sodium chloride for inhalation (10mL sachet)
  o Draw up 2mL of sodium chloride 6% injection
  o Add 2mL of water from a newly opened ampoule of water for injection
  o Use 4mL of diluted sodium chloride solution as a nebuliser solution immediately

or

  o Perform hand hygiene preferably with an alcohol based rub
  o Start with a newly opened solution of 20% sodium chloride for injection (10mL ampoule)
  o Draw up 0.6mL of sodium chloride 20% injection
  o Add 3.4 mL of water from a newly opened ampoule of water for injection
  o Use the 4mL of diluted sodium chloride solution as a nebuliser solution immediately

Frequency (suggested protocol)

  o 2 hourly x 3 doses
  o 4 hourly x 5 doses
  o 6 hourly thereafter

NOTE: Bronchoconstriction has been reported with the use of hypertonic saline in bronchiolitis especially in older infants. CONSIDER adding bronchodilator (Ipratropium bromide [Atrovent™] 250 mcg or Salbutamol 2.5mg) staggered 30 mins prior to each hypertonic saline nebuliser. This is recommended in all infants > 10 months.