BRONCHIOLITIS

See also the PSNZ guideline - Wheeze & Chest Infections in infants under 1 year (www.paediatrics.org.nz)

Definition – What is Bronchiolitis ?

A viral lower respiratory infection which affects children, usually under 12 months of age, with younger infants often more severely affected. Respiratory Syncytial Virus (RSV) is the most common cause, however other viruses can also cause bronchiolitis.

Clinical signs include cough, tachypnoea, and hyperinflation of the chest. There may be audible wheeze, with signs of accessory muscle use in breathing. Auscultation will reveal widespread crepitations and wheeze. There are often thick respiratory secretions which younger infants may have difficulty in clearing.

The illness usually peaks on the second or third day with gradual resolution over 7-10 days. The cough may persist for several weeks.

Assessment

When assessing an infant with bronchiolitis use the Bronchiolitis Assessment Tool in conjunction with other considerations:

BRONCHIOLITIS ASSESSMENT TOOL (B.A.T.)

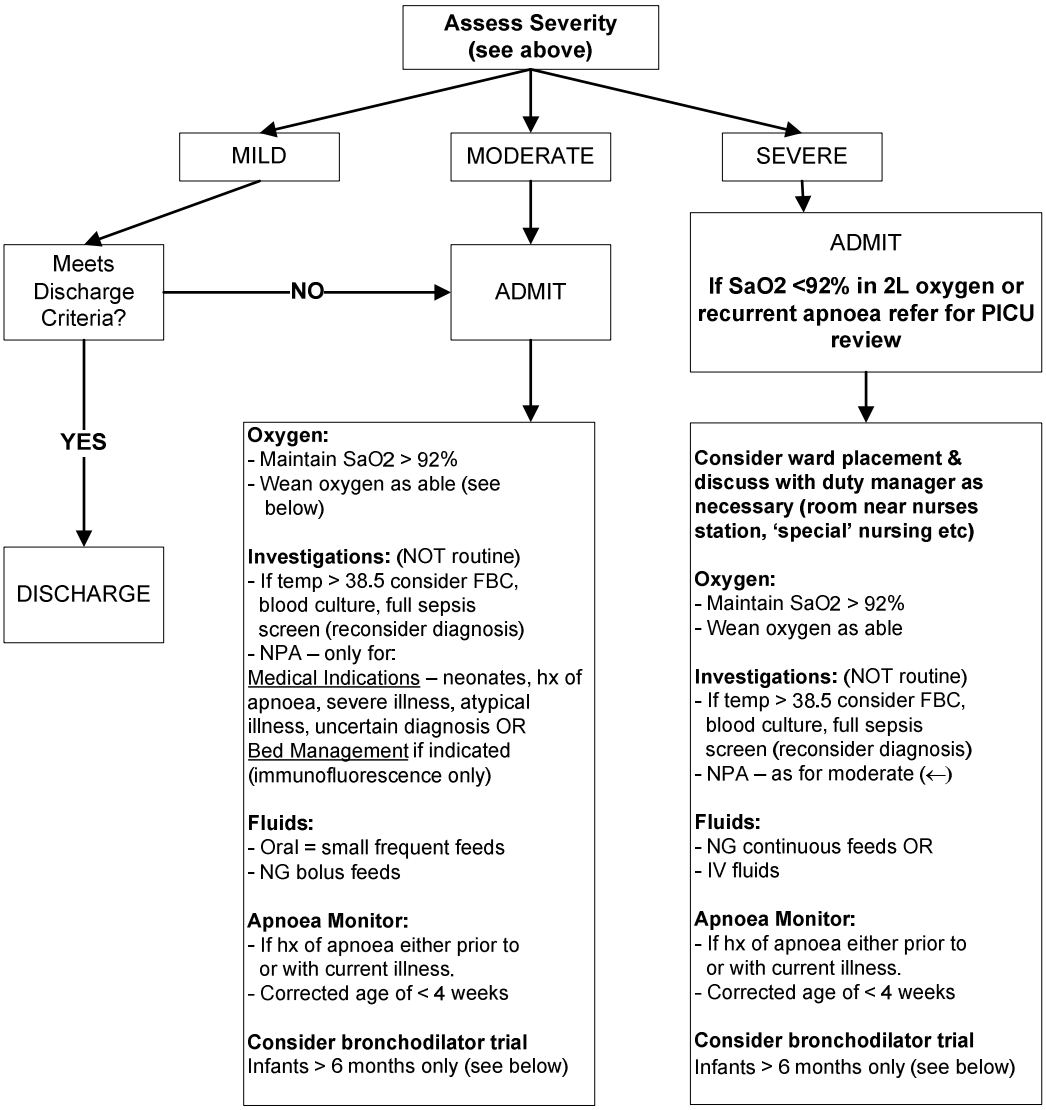
	Mild	**Moderate**	**Severe**
Wheeze	None or end expiratory	Entire expiration	Inspiratory & Expiratory
Feeding	Normal	Less than usual. Frequently stops feeding. More than ½ normal feeds.	Not interested. Gasping / coughing. Less than ½ normal feeds.
Oxygen	No oxygen requirement	May require oxygen	Requires oxygen
Indrawing	No / mild indrawing	Intercostal and / or tracheosternal	Severe with nasal flaring
Behaviour	Normal	Some / intermittent irritability	Irritability and / or lethargy

BRONCHIOLITIS

Other considerations:

- **Risk of Apnoea:** Infants under 4 weeks of age and small ex-premature neonates have a small risk of central apnoea with RSV infections, these children should all be admitted for observation.
- **Stage of the illness.** Is the child stable or improving, or likely to deteriorate over the next few days?
- **Evidence of hypoxia.** Cyanosis always indicates severe disease. Infants who appear pink may be significantly hypoxic. If Oximetry shows O2 saturation of <92% the infant should receive supplementary O2. A lethargic exhausted child is probably hypoxic and is at risk of respiratory failure.
- **Presence of any chronic respiratory or cardiac disease.** Infants with bronchopulmonary dysplasia or congenital heart disease may have more severe problems with bronchiolitis.

Bronchiolitis Management Flow Chart



BRONCHIOLITIS

Admission Guidelines

Admit ALL children with:

- History of apnoea
- Sa02 < 92% on air
- Dehydration

Other factors to consider:

- Underlying medical condition
- Alertness and responsiveness
- Age: prematurity or infants < 1/12
- Severity of illness (see above)
- Day of illness (if early in illness they may get worse before they get better)
- Inability to feed
- Social: access to car or phone, distance from hospital, time of day presenting, parental ability to cope.
- Home environment – smoke exposure, overcrowding, damp or cold housing
- Repeat presentation to CED in this illness
- Recurrent episodes possibly requiring further evaluation

Investigations

Chest X-rays:

Children with a clear clinical diagnosis of bronchiolitis do not require a chest x-ray.

CXR in bronchiolitis will show signs of hyperinflation, peribronchial thickening, and often patchy areas of consolidation and collapse. This may lead to some confusion with pneumonia, however if hyperinflation and wheeze are present the diagnosis should be regarded as bronchiolitis. The aetiology of pneumonia in this age group is predominantly viral.

- A CXR should be done if complications are suspected e.g. Pleural effusion or extraneous air.
- A CXR is indicated in severe cases or where the diagnosis uncertain.

Bloods:

- Blood tests are not needed routinely
- Monitor U & E daily if on IV fluids
- If the infant appears severely unwell consider alternative diagnoses. Clinical signs of concern include lethargy, pallor, hypotonia, severe tachycardia, high temperature or seizures. Investigations for serious sepsis may include urine, CXR, blood culture and CSF. Refer to the "Fever – Investigation & management" guideline for further advice.

BRONCHIOLITIS

Nasopharyngeal aspirates (N.P.A.):

NPA's are not routine.
There are two situations in which an NPA may be requested:

1. **Medical Indications:**
   - Neonates (0-4 weeks)
   - History of apnoea with illness
   - Severe illness
   - Atypical illness
   - Diagnostic uncertainty

Medical staff decide on whether infant meets any of the above indicators. These specimens are sent for rapid immunofluorescence and viral culture.

2. **Bed Management:**

If the wards are full and single rooms are scarce an NPA may be indicated to allow cohorting of patients. The Charge Nurse or Duty Manager will decide when this is necessary.

Other investigations

Children with recurrent admissions to hospital with lower respiratory tract infections should be carefully evaluated for chronic respiratory disease and may need other investigations (e.g. assessment of immune function, sweat test etc). These infants should be discussed with a consultant.

Management

Oxygen

- Oxygen should be administered as necessary to maintain adequate saturation (>92%). O_2 is usually administered via a nasal cannula. Oxygen flow rates of up to 4 L/min can be delivered however for infants and newborns a maximum flow of 2L/min is suggested
- **Infants who are not maintaining satisfactory oxygenation with nasal oxygen or who are having apnoeic episodes require PICU assessment.**
- Weaning oxygen
  Always use your clinical judgement when weaning infants from oxygen therapy.
  Consider reducing oxygen if the child is:
  - clinically stable or improving
  - consistently maintaining $Sa0_2$ > 95%

  Wean down by increments of .5l 0_2 on a high flow meter (2l/min →1.5l/min →1l/min).
  When on 1l/min then switch to low flow meter
  When on low flow meter then decrease from 1l/min →0.5l/min →0.25l/min → room air
  Assess the following ½ hour after each reduction: $Sa0_2$, pulse & resp rate and respiratory effort
  If not consistently maintaining SpO_2 >95%, do not wean further.
  Attempt to wean oxygen every 4hrs day or night

BRONCHIOLITIS

Fluids & Feeding

- Small frequent feeds are recommended
- In moderate & severe cases nasogastric feeds may be needed either as small frequent bolus feeds or as continuous feeds.
- In severe respiratory distress it may be safest to keep the baby 'nil by mouth' and give IV fluids at 75% maintenance. These children should be reviewed by a consultant.
- Dehydration may be a problem at time of presentation to hospital with severe bronchiolitis. For infants with signs of shock (severe tachycardia, poor peripheral perfusion, anuria) consider an initial bolus of normal saline. Slow replacement (over 24hrs+) of estimated deficit should be included in the quantity of IV fluid given as ongoing therapy. Infants who are adequately hydrated but in severe respiratory distress should be commenced on 75% IV maintenance fluids with daily monitoring of weight and electrolytes. Severely unwell infants are at risk of SIADH.

Other

- Saline nose drops (+/- suction) often facilitate feeding and reduces respiratory distress
- An apnoea monitor should be used in those with a history of apnoea, and babies with a corrected age of less than 4 weeks.
- Most children with bronchiolitis do not benefit from bronchodilators and there is some evidence that nebulised bronchodilators can cause babies to deteriorate. Some older infants may benefit from bronchodilators (see below).
- Antibiotics are of no benefit in bronchiolitis and may cause problems such as skin rashes and poor feeding or diarrhoea. A small number of children with bronchiolitis will develop a secondary bacterial chest infection. This should be considered if there is a deterioration associated with a fever.
- Hand decontamination is the most important step in preventing nosocomial spread of RSV. 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. Alcohol-based rubs are preferred for hand decontamination. An alternative is hand-washing with antimicrobial soap. Clinicians should educate personnel and family members on hand sanitation.
- Infants should not be exposed to passive smoking
- Breastfeeding should be continued, and promoted to decrease a child's risk of having LRTI

BRONCHIOLITIS

Bronchodilators

Salbutamol
Most systematic reviews of the use of salbutamol in bronchiolitis show only small short-term improvements in symptom scores and no significant difference in need for admission or length of stay. Some studies have shown a benefit in older infants with a history of recurrent wheeze.

Consider a trial of salbutamol if:

> 6 months old
History of atopy
Previous history of wheeze

- Assessment should be done by the same health professional before the trial spacer begins and then 20 minutes after treatment finished.
- Assessment includes clinical examination, pulse rate, oximetry and Bronchiolitis Assessment Tool (BAT).
- If a trial is indicated then give 6 puffs of 100mcg salbutamol via the spacer (one puff at a time through the spacer).
- Assess whether the child has improved 20 minutes after spacer given
- If there is a positive response then consider charting regular bronchodilators
- Beware of assessing response to salbutamol delivered via a nebuliser as a period of high flow oxygen delivery is likely to result in improvement anyway.

Adrenaline (epinephrine)
There have been a number of trials of nebulised adrenaline (epinephrine) in children with bronchiolitis. There is insufficient evidence to support the use of epinephrine for the treatment of Bronchiolitis.

There is no evidence to support the use of Ipratropium Bromide

Other Treatments

Other treatments which have been tried in Bronchiolitis include:

- Chest physiotherapy – no evidence of benefit (Cochrane review 2007)
- Steroids are not indicated for bronchiolitis, and should only be given if the diagnosis is unequivocally asthma (Cochrane review 2004). Inhaled steroids started during acute bronchiolitis have not been demonstrated to prevent post-bronchiolitis wheezing
- Nebulised hypertonic (3%) saline has recently been reported to reduce length of stay in infants with bronchiolitis. Further studies are underway and a Cochrane protocol has been commenced.
- Caffeine – sometimes used in CED and PICU for very young infants with apnoea. Limited evidence from case reports only. Caffeine should be stopped as soon as an infant is transferred from PICU to the ward as it has a long half-life. This can make decisions regarding safety of discharge more difficult. See http://www.adhb.govt.nz/newborn/DrugProtocols/

BRONCHIOLITIS

Discharge Planning

Before discharging a child consider the following:

- Child clinically stable and improving
- Severity mild-moderate
- Sa02 ≥ 92% on air (should be off oxygen for at least 4 hours)
- Feeding adequately (at least 2/3 of normal feeds)
- Family feel confident in being able to manage at home
- Family have ability to return or seek assistance if deterioration occurs (phone and access to transport)
- Consider nursing or other follow up in the community.

Bronchiolitis and Asthma

A significant proportion (between a third and a half) of infants who have an episode of bronchiolitis develop recurrent wheeze. If an infant has signs of atopy such as eczema, or a family history of atopy, in association with "recurrent bronchiolitis", consider whether this may be an early presentation of reactive airways disease.

References

Yanney MP, Vyas HG. The treatment of Bronchiolitis. Arch Dis Child. Published online Jun 2008 as 10.1136/adc.2007.128736.

Perrotta C. Ortiz Z. Roque M. Chest physiotherapy for acute bronchiolitis in paediatric patients between 0 and 24 months old. Cochrane Database Syst Rev. 2007. CD004873.

Blom D, Ermers M, Bont L, et al. Inhaled corticosteroids during acute bronchiolitis in the prevention of post-bronchiolitic wheezing. Cochrane Database of Systematic Reviews 2007 CD004881.

AAP Policy, Clinical Practice Guidelines, Diagnosis and Management of Bronchiolitis, Pediatrics 2006; 118: 1774-1793

Gadomski AM, Bhasale AL. Bronchodilators for Bronchiolitis. Cochrane Database of Systematic Reviews 2006. CD001266

Ramesh P. Samuels M. Are methylxanthines effective in preventing or reducing apnoeic spells in infants with bronchiolitis?. 2005. Archives of Disease in Childhood. 90(3):321-2