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Bronchiolitis

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DISCLAIMER

IAEM recognises that patients, their situations, Emergency Departments and staff all vary. These guidelines cannot cover all clinical scenarios. The ultimate responsibility for the interpretation and application of these guidelines, the use of current information and a patient's overall care and wellbeing resides with the treating clinician.

Revision History

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GLOSSARY OF TERMS

3%HS	3% hypertonic saline
CO ₂	Carbon dioxide
CPAP	Continuous Positive Airway Pressure
ED	Emergency Department
GP	General Practitioner
HHFNC	Humidified High Flow Nasal Cannula
IV	Intravenous
NICE	National Institute for Health and Care Excellence
NG	Nasogastric
NPA	Nasopharyngeal aspirate
O ₂	Oxygen
Oxy-Hb	Oxyhaemoglobin
PICU	Paediatric Intensive Care Unit
RR	Respiratory rate
RSV	Respiratory Syncytial Virus
Sats	Saturations
SBI	Serious bacterial infection
SIADH	Syndrome of Inappropriate Anti-Diuretic Hormone secretion

Bronchiolitis

INTRODUCTION

Bronchiolitis is a viral lower respiratory tract infection, generally of younger children <12 months of age (peak incidence 3-6 months). Respiratory Syncytial Virus (RSV) is the principal causative agent, although other viruses such as parainfluenza and adenovirus are well recognised as causes of bronchiolitis.

'Bronchiolitis' refers to inflammation of the bronchioles. These are the peripheral airways closest to the alveoli. In bronchiolitis, bronchioles become obstructed with oedema and inflammation.

The characteristic clinical findings in bronchiolitis are widespread crackles and wheezing. Crackles are caused by the bronchioles snapping during opening on inhalation. Upon exhalation one can hear widespread diffuse wheezing. This is caused by narrowing of the slightly larger bronchioles and smaller bronchi which are partially obstructed. In asthma and viral induced wheezing in older children, the bronchioles are not obstructed to the same degree so diffuse wheeze is heard but crackles are not. Hyperinflation is usually also seen because of air trapping that occurs when the infant cannot completely empty their alveoli due to obstruction of the small airways on exhalation. This can often be appreciated clinically.

AIMS

The aim of this document is to provide guidance for the care of infants and children with acute viral bronchiolitis in the Emergency Department (ED).

PARAMETERS

Target audience: This guide is directed at health-care professionals engaged in the acute care of infants and children presenting with viral bronchiolitis.

Patient population: This guideline applies to infants and children presenting to the ED with a clinical diagnosis of acute viral bronchiolitis.

EXCLUSIONS

This guideline does not cover use of humidified high flow nasal cannula (HHFNC) oxygen therapy. Infants and children presenting in acute respiratory distress due to viral bronchiolitis, may benefit from treatment with HHFNC oxygen. Please see IAEM Paediatric Clinical Guideline on “Humidified High Flow Nasal Cannula (HHFNC) oxygen therapy: A guide for use in patients with acute viral bronchiolitis” for further information.

ASSESSMENT

This is a **clinical diagnosis**.

Clinical signs include:

- Cough
- Tachypnoea
- Chest hyperinflation
- There may be audible wheeze with signs of accessory use
- Auscultation may reveal widespread crackles and wheeze

Assessment should include risk factors for apnoea (always admit):

- Premature babies
- Babies less than one month old
- History of apnoea during this episode

The illness usually peaks on day 2-3, with resolution of wheeze and respiratory distress over 7-10 days. Cough may persist for several weeks. Consider early asthma in the older infant.

Be careful when making a diagnosis – patients often carry the diagnosis they are given at admission through their hospitalisation. If a child with asthma is incorrectly diagnosed as having bronchiolitis they may be denied the appropriate treatment. By the same token, if a child with bronchiolitis is diagnosed as having acute viral induced wheeze or asthma they may receive inappropriate treatment.

Admission to hospital is a clinical decision, and based on multiple different factors. Some guidance is given below. For children less than 6 weeks of age (who are at increased risk of complications) admission to hospital is advised.

Table 1. Assessment of severity and ED management

Severity	Signs	Management
Mild	Alert. Pink in air. Well hydrated. Feeding well. Mild respiratory effort O ₂ sats >94%.	Can be managed at home. Advise parents on the expected course and when to return, if there are problems. Recommend smaller, more frequent feeds. Review by GP within 24 hours. Give parent information leaflet .
Moderate	Poor feeding. Lethargy. Moderate respiratory distress. Hypoxia.	Admit. NG feed if not tolerating oral intake (large bolus feeds should be avoided). Administer O ₂ to maintain sats >92%. Consider IV fluids, 80% maintenance (risk of SIADH). Supportive care. Close observation.
Severe	As above with: RR>70. Severe respiratory distress. Sweating, irritable or apnoeas. Lethargy or exhausted CO ₂ retention.	As above and: Minimal handling. Administer O ₂ to maintain sats >92%. May need rebreather. IV fluids, hold feeds until safe. Cardiorespiratory monitoring. Consider bacterial superinfection. Inform PICU team. May require CPAP or ventilation.

INVESTIGATIONS

Apart from children with severe or life threatening bronchiolitis (see below), the only test that is indicated in acute bronchiolitis is a nasopharyngeal aspirate (NPA) for viruses. Chest X-rays and blood tests are not routinely indicated. Bacterial airway cultures are not indicated.

MANAGEMENT

General principles

The basic principles of supportive care in bronchiolitis are of enormous importance. Babies with bronchiolitis tend to be irritable and fussy. The causes of this are multifactorial, but prominent contributory factors are most likely tiredness from increased energy expenditure, hypoxia, pain or discomfort from upper airway inflammation such as pharyngitis, rhinitis and otitis, and hunger. Generous use of analgesics and antipyretics is likely to be of some benefit here, particularly in the setting of fever. In addition, the value of rest and sleep should not be underestimated. This can be facilitated by ensuring that hunger and discomfort are tackled, and **unnecessary treatments and interventions are avoided**.

Feeding

There is little robust evidence in the literature in relation to feeding and hydration in bronchiolitis. In general, if infants can feed by themselves and achieve adequate hydration without significant dyspnoea they should be allowed to do so. If this is not the case, supplemental fluids and or feeds should be administered. In children with severe respiratory distress, the placement of NG tubes and enteric feeding increases the risk of aspiration and should be avoided until the child is more stable. These children should be given IV fluids.

In infants with moderate respiratory distress who cannot take adequate feeds, NG feeding may reduce hunger and provide calories and hydration. With hyperinflation, gastro-oesophageal reflux is more common, and a full stomach will lead to splinting of the diaphragm, so large bolus feeds should be avoided. One to two hourly bolus feeds at 80% maintenance, or continuous feeds are advised.

Oxygen

There are no studies examining the effect of supplemental O₂ on recovery from bronchiolitis and no data on which to base safe haemoglobin saturation limits for admission and discharge from hospital or indeed during admission. It is advised that O₂ should be used judiciously to keep oxyhaemoglobin (oxy-Hb) saturations above 92%. Excess O₂ is toxic to the respiratory epithelium and can make atelectasis worse.

Medications

The most important question about medications used for acute bronchiolitis is: **Do they reduce hospital admission rates;** and **do they shorten hospital stay?** This is the most important thing for the child, the parents and the hospital.

The other important question we must ask is does the medication reduce the complications or sequelae of bronchiolitis. No medications have been shown to do this. If a medication does not significantly reduce hospital stay or reduce long-term sequelae of bronchiolitis, **it should not be given.** To give a medicine that is not indicated increases parental anxiety, disturbs the child unnecessarily and most importantly is poor clinical practise.

The following medications have **not** been shown to reduce hospital stay or reduce sequelae of acute bronchiolitis:

- Salbutamol
- Ipratropium bromide
- Hypertonic saline (3%)
- Nebulised normal saline
- Antibiotics
- Montelukast
- Steroids
- Epinephrine
- Macrolides
- Antivirals

These medications should not be routinely used in infants with acute bronchiolitis.

A recent meta-analysis and review of the literature has determined that 3% hypertonic saline (3%HS) **does not shorten hospital stay** for infants with bronchiolitis. NICE have recently advised against its routine use for bronchiolitis. However, two recent papers have suggested that **a single dose** of 3%HS in the **ED** setting may reduce hospitalisation rates in a subgroup of infants, and this should be used at the discretion of the treating physician.

Physiotherapy

There is no role for physiotherapy in acute bronchiolitis

DISCHARGE

There is little evidence to guide discharge of infants with acute bronchiolitis from hospital. In general terms, once we are doing nothing in the hospital that the parents cannot do at home, the child can be discharged. The maintenance of oxy-Hb saturations >92% without supplemental O₂ (for >4 hours, including during sleep), the ability to take enough feed to remain hydrated and the absence of significant fever are widely used discharge criteria that should apply everywhere. Additional criteria may apply to individual children depending on their hospital course. Wheezing alone is not a reason to keep a child in hospital.

SUMMARY

In summary, bronchiolitis is a clinical diagnosis, the accuracy of which is vital to inform appropriate treatment. Apart from an NPA, no other diagnostic tests are routinely indicated. Supportive care is the mainstay, with particular attention to feeding methods, minimal handling and close monitoring. No therapeutic agents are routinely indicated for infants with bronchiolitis.

SPECIAL CONSIDERATIONS

Severe Bronchiolitis

In cases where an infant has clinical bronchiolitis that is severe or life threatening on presentation or during a hospitalisation, the PICU team should be contacted immediately. Care must be taken that there are no underlying or additional co-morbidities. In these circumstances a chest X-ray, blood gas and any other clinically indicated tests should be performed, and treatments that are felt by the medical team to be clinically indicated should be given.

Bacterial superinfection

The literature would suggest that this is uncommon. Only 20% of infants with bronchiolitis admitted to PICU have evidence of bacteria in the lower airways. It is unclear whether this is a cause for severe illness or a marker. Signs suggestive of superinfection include:

- Fever out of context with recent temperature trend
- Sudden acute deterioration in clinical status

There is some evidence that serious bacterial infection (SBI) other than pneumonia, e.g. bacterial meningitis, urinary tract infection, can co-exist with bronchiolitis in neonates in particular. Specifically, a **baby < 8 weeks old** with a febrile illness and clinical bronchiolitis should have a septic screen performed, and be admitted for empiric antibiotic cover.

RSV prophylaxis (palivizumab)

RSV prophylaxis (palivizumab) is recommended for selected infants and children, namely those with:

- Bronchopulmonary dysplasia
- Congenital Heart Disease
- Age <35/40 at the start of the bronchiolitis season

COMPANION DOCUMENT

- Parent information leaflet. https://www.rch.org.au/kidsinfo/fact_sheets/Bronchiolitis/