Bronchiolitis in Children

Note:

This guideline provides advice of a general nature. This statewide guideline has been prepared to promote and facilitate standardisation and consistency of practice, using a multidisciplinary approach. The guideline is based on a review of published evidence and expert opinion.

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

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Health practitioners in the South Australian public health sector are expected to review specific details of each patient and professionally assess the applicability of the relevant guideline to that clinical situation.

If for good clinical reasons, a decision is made to depart from the guideline, the responsible clinician must document in the patient's medical record, the decision made, by whom, and detailed reasons for the departure from the guideline.

This statewide guideline does not address all the elements of clinical practice and assumes that the individual clinicians are responsible for discussing 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,
- Advising consumers of their choice and ensuring informed consent is obtained,
- Providing care within scope of practice, meeting all legislative requirements and maintaining standards of professional conduct, and
- Documenting all care in accordance with mandatory and local requirements

Explanation of the aboriginal artwork:
The aboriginal artwork used symbolises the connection to country and the circle shape shows the strong relationships amongst families and the aboriginal culture. The horse shoe shape design shown in front of the generic statement symbolises a woman and those enclosing a smaller horse shoe shape depicts a pregnant woman. The smaller horse shoe shape in this instance represents the unborn child. The artwork shown before the specific statements within the document symbolises a footprint and demonstrates the need to move forward together in unison.

Cultural safety enhances clinical safety.

To secure the best health outcomes, clinicians must provide a culturally safe health care experience for Aboriginal children, young people and their families. Aboriginal children are born into strong kinship structures where roles and responsibilities are integral and woven into the social fabric of Aboriginal societies.

Australian Aboriginal culture is the oldest living culture in the world, yet Aboriginal people currently experience the poorest health outcomes when compared to non-Aboriginal Australians.

It remains a national disgrace that Australia has one of the highest youth suicide rates in the world. The over representation of Aboriginal children and young people in out of home care and juvenile detention and justice system is intolerable.

The accumulative effects of forced removal of Aboriginal children, poverty, exposure to violence, historical and transgenerational trauma, the ongoing effects of past and present systemic racism, culturally unsafe and discriminatory health services are all major contributors to the disparities in Aboriginal health outcomes.

Clinicians can secure positive long term health and wellbeing outcomes by making well informed clinical decisions based on cultural considerations

The term Aboriginal' is used to refer to people who identify as Aboriginal, Torres Strait Islanders, or both Aboriginal and Torres Strait Islander. This is done because the people indigenous to South Australia are Aboriginal and we respect that many Aboriginal people prefer the term 'Aboriginal'. We also acknowledge and respect that many Aboriginal South Australians prefer to be known by their specific language group(s).

Purpose and Scope of PCPG

The management of Bronchiolitis in Children is primarily aimed at medical staff working in any of primary care, local, regional, general or tertiary hospitals. It may however assist 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 bronchiolitis; it does not replace or remove clinical judgement or the professional care and duty necessary for each specific case.

This guideline has been developed to provide evidence based clinical framework for the management of infants (0-12 months) with bronchiolitis. Application of these guidelines for children over 12 months may be relevant but there is less diagnostic certainty in the 12-24 month age group. (All references to age within this guideline refer to chronological age unless stated otherwise.)

Table of Contents

Important Points

- Bronchiolitis is a clinical diagnosis.
- Patients with more than mild disease need to be managed in hospital.
- The main treatment of bronchiolitis is supportive. This involves ensuring appropriate oxygenation and fluid intake.
- Other investigations or management are usually not indicated.

Abbreviations

CPAP	continuous positive airway pressure
EWT	early warning tool
HDU	high dependency unit
HHFNC	heated humidified high flow oxygen/air via nasal cannulae
HFNC	high flow oxygen/air via nasal cannulae
High Flow	Administered 1–2 litres per kg per minute
IV	Intravenous
NG	Nasogastric
NPO_2	Nasal Prong Oxygen
PICU	Paediatric Intensive Care Unit
ED	Emergency department
O_2	Oxygen

Definitions

Bronchiolitis	A viral infection of the lower respiratory tract.

Introduction

- Bronchiolitis it is a common presentation in infants and may occur in young children up to 24 months.
- Bronchiolitis results from a viral infection of the lower respiratory tract.
- Incidence peaks in winter months.
- It is one of the most common causes for presentation to primary care, emergency departments and for admission to hospital.

Management Summary for Bronchiolitis

Initial Assessment

This table is meant to provide guidance in order to stratify severity.

The more symptoms the infant has in the moderate-severe categories, the more likely they are to develop severe disease.

	Mild	Moderate	Severe
Behaviour	• Normal	• Some/intermittent irritability	• Increasing irritability and/or lethargy • Fatigue
Respiratory Rate	• Normal – mild tachypnoea	• Increased respiratory rate	• Marked increase or decrease in respiratory rate • Respiratory rate may slow with exhaustion or severe obstruction
Use of accessory muscles	• Nil to mild chest wall retraction	• Moderate chest wall retractions • Tracheal tug • Nasal flaring	• Marked chest wall retractions • Marked tracheal tug • Marked nasal flaring
Auscultation	• Scattered wheeze / crepitation	• Wide spread wheeze crepitation's	• Wheeze crepitation may decrease with reduced air entry
Oxygen saturation / oxygen requirement	• O_2 saturations greater than 92% (in room air)	• O_2 saturations 90 - 92% (in room air)	• O_2 saturations less than 90% (in room air) • Hypoxemia, may not be corrected by O_2
Apnoeic episodes	• None	• May have brief apnoea	• May have increasingly frequent or prolonged apnoea
Feeding	• Normal	• May have difficulty with feeding or reduced feeding	• Reluctant or unable to feed

Initial Management

The main treatment of bronchiolitis is supportive. This involves ensuring appropriate oxygenation and fluid intake.

	Mild	Moderate	Severe
Likelihood of Admission	• Suitable for discharge • Consider risk factors	• Likely admission, may be able to be discharged • after a period of observation • Management should be discussed with a local senior physician	• Requires admission and consider need for transfer to an appropriate children's facility/PICU • Threshold for referral is determined by local escalation policies but should be early
Observations Vital signs (*respiratory rate, heart rate, O2 saturations, temperature*)	• Adequate assessment in ED prior to discharge (minimum of two recorded measurements or every four hours as per local hospital guidelines and EWT)	• Hourly - dependent on condition (as per local hospital guidelines and EWT)	• Hourly with continuous cardiorespiratory (including oximetry) monitoring and close nursing observation - dependent on condition (as per local hospital guidelines and EWT)
Hydration/ Nutrition	• Small frequent feeds	• If not feeding adequately (less than 50% over 12 hours), administer NG or IV hydration	• If not feeding adequately (less than 50% over 12 hours), or unable to feed, administer NG or IV hydration
Oxygen saturation/ oxygen requirement	• Nil requirement	• Administer O_2 to maintain saturations greater than or equal to 92%	• Administer O_2 to • maintain saturations greater than or equal to 92%
Respiratory Support	• Nasal oxygen • Consider HFNC if a trial of NPO_2 is ineffective	• Nasal oxygen • Consider HFNC or CPAP	• HFNC or Respiratory Support
Disposition/ Escalation	• Consider further medical review if early in the illness and any risk factors are present or if child develops increasing severity after discharge	• Decision to admit should be supported by clinical assessment, social and geographical factors and phase of illness	• Consider escalation if severity does not improve. • Consider ICU review/ admission or transfer to local centre with paediatric HDU/ICU capacity if: - Severity does not improve - Persistent desaturations - Significant or recurrent apnoea's associated with desaturations
Parental Education	• Provide advice on the expected course of illness and when to return (worsening symptoms and inability to feed adequately) • Provide Parent Information Sheet	• Provide advice on the expected course of illness and when to return (worsening symptoms and inability to feed adequately) • Provide Parent Information Sheet	• Provide advice on the expected course of illness • Provide Parent Information Sheet

Investigations

In most infants presenting to hospital and/or hospitalised with bronchiolitis, **no** investigations are required.

Chest x-ray (CXR)

- Is not routinely indicated in infants presenting with bronchiolitis and may lead to unnecessary treatment with antibiotics with subsequent risk of adverse events

Blood tests (including full blood count (FBC), blood cultures)

- Have no role in management

Virological testing (nasopharyngeal swab or aspirate)

- Has no role in management of individual patients

Urine microscopy and culture

- May be considered to identify urinary tract infection if a temperature over 38 degrees in an infant less than two months of age with bronchiolitis.

Management

Respiratory Support

- Oxygen therapy should be instituted when oxygen saturations are persistently less than 92%
- It is appreciated that infants with bronchiolitis will have brief episodes of mild/moderate desaturations to levels less than 92%. These brief desaturations are not a reason to commence oxygen therapy.
- Oxygen should be discontinued when oxygen saturations are persistently greater than or equal to 92% + patient otherwise stable or improving.
- **Heated humidified high flow oxygen/air via nasal cannulae** (HHFNC) can be considered in the presence of hypoxia (oxygen saturation less than 92%) and moderate to severe recessions. Its use in infants without hypoxia should be limited to the randomised controlled trial (RCT) setting only.
- HFNC is usually administered at a flow rate of 1–2 l./kg/Min with inspired oxygen concentration to maintain oxygen saturation $\geq$ 92%.

Monitoring

- Observations as per local hospital guidelines and Early Warning Tools (EWTs).
- **Continuous oximetry** should not be routinely used to dictate medical management unless disease is severe.

Hydration/Nutrition

- When non-oral hydration is required either intravenous (IV) or nasogastric (NG) hydration are appropriate.
- If IV fluid is used it should be isotonic (0.9% Sodium Chloride with Glucose or similar).
- The ideal volume of IV or NG fluids required to maintain hydration remains unknown; between 60% - 100% of maintenance fluid is an appropriate volume to initiate.

Medication

- **Beta 2 agonists** – Do not administer beta 2 agonists (including those with a personal or family history of atopy).
- **Corticosteroids** – Do not administer systemic or local glucocorticoids (nebulised, oral, intramuscular (IM) or IV)
- **Adrenaline** – Do not administer adrenaline (nebulised, IM or IV) except in peri-arrest or arrest situation.
- **Hypertonic Saline** – Do not administer nebulised hypertonic saline
- **Antibiotics** – Including Azithromycin are not indicated in bronchiolitis
- **Antivirals** – Are not indicated

Nasal Suction

- **Nasal suction** is not routinely recommended. Superficial nasal suction may be considered in those with moderate disease to assist feeding
- **Nasal sodium chloride 0.9% drops** may be considered at time of feeding

Chest Physiotherapy

- Is not indicated
- May be required for complications such as aspiration or pneumonia.

Ongoing management

- **HFNC or Nasal CPAP** therapy may be considered in the appropriate ward setting

Discharge planning and community-based management

- Infants can be discharged when oxygen saturations are greater than or equal to 92%; there is no more than mild recession and feeding is adequate
- Infants younger than 8 weeks of age are at an increased risk of representation
- Discharge on home oxygen can be considered after a period of observation in selected infants as per local policies, if appropriate community short term oxygen therapy is available.
- Follow up and review as per local practice

Education (parent/care-giver)

- A Bronchiolitis Parent Information Sheet should be provided
- Parents should be educated about the illness, the expected progression and when and where to seek further medical care

Safety initiatives

- Use simple infection control practices such as hand washing
- **Cohorting** of infants (based on virological testing) has not been shown to improve outcomes; however is not unreasonable when facilities allow for it.

Clinical Recommendations

Diagnosis

1. Infants can be diagnosed with bronchiolitis if they have an upper respiratory tract infection followed by onset of respiratory distress with fever, and one or more of: cough, tachypnoea, retractions and diffuse crackles or wheeze on auscultation. *(NHMRC: C, GRADE: Weak)*
2. Clinicians should consider as risk factors for more serious illness: gestational age less than 37 weeks; chronological age at presentation less than 10 weeks; exposure to cigarette smoke; breast feeding for less than two months; failure to thrive; having chronic lung disease; having chronic heart and/or chronic neurological conditions; being Indigenous ethnicity, and should take these into account when managing infants with bronchiolitis. *(NHMRC: C, GRADE: Conditional)*
3. Routine CXR is not recommended as it does not improve management in infants presenting with simple bronchiolitis, and may lead to treatments of no benefit. *(NHMRC: D, GRADE: Conditional)*
4. There is no role for blood tests in managing infants presenting to hospital and hospitalised with bronchiolitis. Routine bacteriological testing of blood and urine is not recommended. *(NHMRC: D, GRADE: Conditional)* In infants less than two months of age presenting to hospital or hospitalised with bronchiolitis with a temperature over 38 degrees, there is a low risk of urinary tract infection (UTI). If clinical uncertainty exists clinicians may consider collecting a urine sample for microscopy, culture and sensitivity looking for the concurrent presence of UTI.
5. In infants with bronchiolitis, routine use of viral testing is not recommended for any clinically relevant end-points, including cohorting of bronchiolitis patients. *(NHMRC: C, GRADE: Conditional)*

Management

6. For infants presenting to hospital or hospitalised with bronchiolitis, there is insufficient evidence to recommend the use of a scoring system to predict need for admission or hospital length of stay. *(NHMRC: D, GRADE: Weak)*
7. Oxygen saturations, adequacy of feeding, age (infants younger than eight weeks), and lack of social support should be considered at the time of discharge as a risk for representation. There is insufficient evidence to recommend absolute discharge criteria for infants attending the ED, or hospitalised with bronchiolitis *(NHMRC: Practice Point, GRADE: Weak)*
8. **a)** Do not administer beta 2 agonists to infants, less than or equal to 12 months of age, presenting to hospital or hospitalised with bronchiolitis. *(NHMRC: A, GRADE: Strong)* **b)** Do not administer beta 2 agonists to infants, less than or equal to 12 months of age, presenting to hospital or hospitalised with bronchiolitis, with a personal or family history of atopy. *(NHMRC: D, GRADE: Weak)*

9. Do not administer adrenaline/epinephrine to infants presenting to hospital or hospitalised with bronchiolitis. *(NHMRC: B, GRADE: Strong)*
10. Do not administer nebulised hypertonic saline in infants presenting to hospital or hospitalised with bronchiolitis. *(NHMRC: D, GRADE: Conditional)*
11. a) Do not administer systemic or local glucocorticoids to infants presenting to hospital or hospitalised with bronchiolitis. *(NHMRC: B, GRADE: Strong)* **b)** Do not administer systemic or local glucocorticoids to infants presenting to hospital or hospitalised with bronchiolitis, with a positive response to beta 2 agonists. *(NHMRC: D, GRADE: Weak)* **c)** Do not administer a combination of systemic or local glucocorticoids and adrenaline/epinephrine to infants presenting to hospital or hospitalised with bronchiolitis. (*NHMRC: D, GRADE: Weak)*
12. a) Consider the use of supplemental oxygen in the treatment of hypoxic (oxygen saturations less than 92%) infants with bronchiolitis. *(NHMRC: C, GRADE: Conditional)* **b)** In uncomplicated bronchiolitis oxygen supplementation should be commenced if the oxygen saturation level is sustained at a level less than 92%. At oxygen saturation levels of 92% or greater, oxygen therapy should be discontinued. *(NHMRC: C, GRADE: Conditional)*
13. Routine use of continuous pulse oximetry is not required for medical management of non-hypoxic (saturations greater than or equal to 92%) infants not receiving oxygen, or stable infants receiving oxygen. *(NHMRC: C, GRADE: Conditional)*
14. High Flow Nasal Cannulae Oxygen (HFNC) in bronchiolitis can be considered in the inpatient setting on infants with bronchiolitis with hypoxia (oxygen saturations less than 92%). Its use in children without hypoxia should be limited to the RCT setting only. *(NHMRC: C, GRADE: Conditional)*
15. Chest physiotherapy is not recommended for routine use in infants with bronchiolitis. *(NHMRC: B, GRADE: Strong)*
16. a) Nasal suction is not recommended as routine practice in the management of infants with bronchiolitis. Superficial nasal suction may be considered in those with moderate disease to assist feeding. *(NHMRC: D, GRADE: Conditional)* **b)** Deep nasal suction for the management of bronchiolitis is not recommended. *(NHMRC: D, GRADE: Conditional)*
17. Routine nasal saline drops are not recommended. Trial of intermittent saline drops may be considered at time of feeding. *(NHMRC: Practice Point, GRADE: Weak)*
18. Nasal CPAP therapy for infants with bronchiolitis may be considered for the management of infants. *(NHMRC: C, GRADE: Conditional)*

19. After a period of observation, infants at low risk for severe bronchiolitis can be considered for discharge on home oxygen as part of an organised 'Home Oxygen Program' which has clear 'Return to Hospital' advice.

(NHMRC: C, GRADE: Conditional)

20. a) Do not use antibiotics to treat infants with bronchiolitis.

(NHMRC: B, GRADE: Conditional)

b) Do not use azithromycin for treatment of infants admitted to hospital with bronchiolitis.

(NHMRC: B, GRADE: Conditional)

c) Do not use azithromycin for treatment of infants admitted to hospital with bronchiolitis who are at risk of developing bronchiectasis.

(NHMRC: C, GRADE: Conditional)

21. a. Supplemental hydration is recommended for infants who cannot maintain hydration orally.

(NHMRC: Practice Point, GRADE: Weak)

b) Both NG and IV routes are acceptable means for non-oral hydration in infants admitted to hospital with bronchiolitis.

(NHMRC: B, GRADE: Strong)

c) There is insufficient evidence to recommend a specific proportion of maintenance fluid. There is a risk of fluid overload therefore judicious and vigilant use of hydration fluid is and regular clinical review is recommended. Isotonic fluid is recommended.

(NHMRC: Practice Point, GRADE: Weak)

22. Hand hygiene is the most effective intervention to reduce hospital acquired infections and is recommended. There is inadequate evidence for benefits in cohorting infants with bronchiolitis.

(NHMRC: D, GRADE: Weak)

Diagnosis

Viral bronchiolitis is a clinical diagnosis, based on typical history and examination. Peak severity is usually at around day two to three of the illness with resolution over 7-10 days. The cough may persist for weeks. Bronchiolitis most commonly occurs in the winter months, but can be seen all year round.

Features

Bronchiolitis typically begins with an acute upper respiratory tract infection followed by onset of respiratory distress and fever and one or more of:

- Cough
- Tachypnoea
- Retractions
- Widespread crackles or wheeze

Bronchiolitis is usually self-limiting, often requiring no treatment or interventions.

Risk factors for more serious illness

- Gestational age less than 37 weeks
- Chronological age at presentation less than 10 weeks
- Postnatal exposure to cigarette smoke
- Breast fed for less than two months
- Failure to thrive
- Chronic lung disease
- Congenital heart disease
- Chronic neurological conditions
- Indigenous ethnicity

Infants with any of these risk factors are more likely to deteriorate rapidly and require escalation of care. Consider hospital admission even if presenting early in illness with mild symptoms.

References

This guideline is an adaptation of the Australasian Bronchiolitis Guideline developed by the Paediatric Research in Emergency Departments International Collaborative (PREDICT) research network.

- Australasian Bronchiolitis Guideline (short version), Paediatric Research in Emergency Departments International Collaborative (PREDICT), [Internet]. Parkville Victoria 3052: Murdoch Children's Research Institute West; 2016 [cited 2017 10 Oct]. Available from: http://www.predict.org.au/publications/2016-pubs/.

The following article was found to be relevant:

- Florin T. A., Plint A. C., Zorc J. J. (2017). Viral bronchiolitis. Lancet 389, 10065, 211–224. DOI: 10.1016/S0140-6736(16)30951-5.

Acknowledgements

The South Australian Child and Adolescent Health Community of Practice gratefully acknowledge the contribution of clinicians and other stakeholders who participated throughout the development process of the Australasian Bronchiolitis Guideline particularly the Paediatric Research in Emergency Departments International Collaborative (PREDICT) Guideline Advisory Group and Multidisciplinary Guideline Development Committee.

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Endorsed by: SA Safety and Quality Strategic Governance Committee
Next review due: 05/07/2023
ISBN number: 978-1-74243-898-6
PDS reference: **CG091**
Policy history: Is this a new policy (V1)? **N**
Does this policy amend or update and existing policy? **Y**
If so, which version? **V1**
Does this policy replace another policy with a different title? **N**
If so, which policy (title)?

Approval Date	Version	Who approved New/Revised Version	Reason for Change
05/07/18	V2	SA Health Safety & Quality Strategic Governance Committee	Reviewed in line with scheduled review period. This version is an adaptation of the Australasian Bronchiolitis Guideline by PREDICT (31 August 2016)
01/07/13	V1	SA Health Safety & Quality Strategic Governance Committee	Original