
# Paediatric Research in Emergency Departments International Collaborative (PREDICT)

# Australasian Bronchiolitis Guideline: 2025 Update

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# Acknowledgments

The Paediatric Research in Emergency Departments International Collaborative (PREDICT) research network produced the 2025 update to the Australasian Bronchiolitis Guideline with support of the following clinical and methodological expertise:

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# Abbreviations and Acronyms

| | |
|---|---|
| ALRI | Acute lower respiratory infection |
| aOR | Adjusted odds ratio |
| AUC | Area under the curve |
| BiPAP | Bilevel positive airway pressure |
| BPD | Bronchopulmonary dysplasia |
| BROSJOD | Bronchiolitis Score of Sant Joan de Déu |
| CDH | Congenital diaphragmatic hernia |
| CDSS | Clinical Disease Severity Score |
| CHD | Congenital heart disease |
| CHWRS | Children's Hospital of Wisconsin Respiratory Score |
| CI | Confidence interval |
| CLD | Chronic lung disease |
| CPAP | Continuous positive airway pressure |
| CRP | C-reactive protein |
| CXR | Chest Xray |
| DFA | Direct fluorescent antibody |
| EBSA | Escalada de Severidad de la Bronquiolitis Aguda (Acute Bronchiolitis Severity Scale) |
| ED | Emergency department |
| ETR | Evidence to recommendations |
| EWT | Early warning tools |
| FBC | Full blood count |
| $FiO_2$ | Fractional concentration of inspired oxygen |
| GAG | Guideline Advisory Group |
| GDC | Guideline Development Committee |
| GRADE | Grading of Recommendations Assessment, Development and Evaluation |
| GRSS | Global Respiratory Severity Score |
| HDU | High dependency unit |
| HF | High flow |
| HR | Hazard ratio |
| ICU | Intensive care unit |
| IF | Immunofluorescence |
| IM | Intramuscular |
| IRR | Incidence rate ratio |
| IQR | Interquartile range |
| ITT | Intention-to-treat |
| IV | Intravenous |
| JBI | Joanna Briggs Institute |
| LFO | Low flow oxygen |
| LRTI | Lower respiratory tract infection |
| M-WCAS | Modified Wood's Clinical Asthma Score |
| MD | Mean difference |
| MDI | Metered dose inhaler |

| | |
|---|---|
| mITT | Modified intention-to-treat |
| mTal | Modified Tal score |
| MV | Mechanical ventilation |
| ND | Nasoduodenal |
| NA | Not applicable |
| NG | Nasogastric |
| NHMRC | National Health and Medical Research Council |
| NICU | Neonatal intensive care unit |
| $NO_2$ | Nitrogen dioxide |
| $O_2$ | Oxygen |
| OG | Orogastric |
| OR | Odds ratio |
| PCT | Procalcitonin |
| PCR | Polymerase chain reaction |
| PICO | Population, intervention, comparator, outcome |
| PICU | Paediatric intensive care unit |
| PREDICT | Paediatric Research in Emergency Departments International Collaborative |
| PROBAST | Prediction model Risk Of Bias ASessment Tool |
| RCT | Randomised controlled trial |
| RDAI | Respiratory Distress Assessment Instrument |
| RIS | Respiratory Index Score |
| RoB2 | Risk of Bias 2 tool |
| ROBINS-E | Risk Of Bias In Non-randomised Studies of Exposures tool |
| ROBINS-I | Risk Of Bias In Non-randomised Studies of Interventions tool |
| RSV | Respiratory syncytial virus |
| RR | Relative risk |
| RRR | Relative risk reduction |
| SARS-CoV-2 | Severe acute respiratory syndrome coronavirus-2 |
| SiADH | Syndrome of inappropriate antidiuretic hormone secretion |
| SMD | Standardised mean difference |
| $SO_2$ | Sulphur dioxide |
| $SpO_2$ | Peripheral oxygen saturation |
| UTI | Urinary tract infection |
| WBSS | Wang Bronchiolitis Severity Score |
| WCC | White blood cell counts |
| WDF | Wood Downes Ferres |
| wGA | Weeks' gestational age |

# Executive Summary

Bronchiolitis is one of the most common reasons for hospital admission in Australian and Aotearoa New Zealand infants. The Australasian Bronchiolitis Guideline aims to provide evidence-based clinical guidance on the management of infants (<12 months) presenting or admitted to hospital with bronchiolitis. The recommendations are applicable to emergency departments (EDs), general paediatric wards, and intensive care units (ICUs) in Australasian hospitals. The guidance has been developed for clinicians working within these settings.

This guideline was originally developed in 2016. The scope of the guideline has been expanded in this 2025 update to include recommendations on respiratory syncytial virus (RSV) prevention, the management of severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) co-infection, and bronchiolitis management in intensive care settings (up to but not including intubation). Forty-one recommendations have been developed on 25 topics by 29 clinical and methodological experts from Australasia serving within the overseeing Guideline Advisory Group (GAG) and the consultative Guideline Development Committee (GDC). The recommendations were based on systematic reviews (final search 24 January 2025), and appraisals of the evidence using the Grading of Recommendations, Assessment, Development and Evaluations (GRADE) approach. Each recommendation was finalised through consensus discussion and voting of the GAG and GDC, who considered the balance of benefits and harms, resource implications, feasibility in the Australasian context, acceptability, interest-holder values and preferences, and the equity and human rights implications of the proposed action.

The implications of the recommendations for bronchiolitis diagnosis and management are summarised below. For detailed information of the underlying evidence, please refer to the guideline report and annex. Explanation of the recommendation strength and evidence quality definitions are described in Table 1.

## Diagnosis

Bronchiolitis is a clinical diagnosis that is based on typical history and examination. The peak severity of bronchiolitis usually occurs at day two to three of illness, with resolution over seven to ten days. The associated cough may persist for weeks. Bronchiolitis most commonly occurs in the winter months in temperate regions but can be seen year-round in tropical regions.

## Clinical signs and symptoms

Consider a diagnosis of bronchiolitis in an infant if they have an upper respiratory tract infection (rhinorrhoea, nasal congestion, and/or cough), followed by the onset of a lower respiratory tract infection involving one or more of the following: respiratory distress (tachypnoea and/or retractions), presence of diffuse crackles and/or wheeze. These symptoms may occur with or without the presence of fever. Additional signs and symptoms may include feeding difficulties, vomiting, dehydration, hypoxaemia, lethargy, and uncommonly (<5%) diarrhoea, and rarely (<2%) apnoea. *(Evidence quality:* very low*; recommendation strength:* weak)

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

*Table 1. GRADE recommendation strength and evidence quality definitions.*

| Recommendation strength | Definition | Recommendation language |
|---|---|---|
| Strong | The GDC is confident that the desirable effects of the action outweigh its undesirable effects, or vice versa. Most or all individuals will be best served by the recommended course of action. | "Use..."<br>"Do not..."<br>"Clinicians should..." |
| Weak | The desirable effects of the action probably outweigh the undesirable effects, or vice versa, but appreciable uncertainty exists. Not all individuals will be best served by the recommended course of action. | "Consider..."<br>"Do not routinely..." |
| Conditional | A *weak* recommendation where the recommended course of action may depend on patient factors, resources or setting. | |
| Consensus-based recommendation | A recommendation formulated through GAG and GDC consensus in the absence of evidence, where a systematic review of the evidence was conducted as part of the search strategy. | |

| Evidence quality ratings | Contributing factors |
|---|---|
| ⊕⊕⊕⊕ High | • Risk of bias (↓ or ↓↓)<br>• Inconsistency of results (↓ or ↓↓)<br>• Indirectness of evidence (↓ or ↓↓)<br>• Imprecision (↓ or ↓↓)<br>• Publication bias (↓ or ↓↓)<br>• Large magnitude of effect (↑ or ↑↑) [a]<br>• Plausible confounding would reduce the demonstrated effect (or increase the effect if no effect observed) (↑)[a]<br>• Demonstrated dose-response gradient (↑)[a] |
| ⊕⊕⊕⊖ Moderate | |
| ⊕⊕⊖⊖ Low | |
| ⊕⊖⊖⊖ Very low | |
| Not applicable (NA) | No eligible evidence |

GDC = Guideline Development Committee; GAG = Guideline Advisory Group. Reproduced from the GRADE Handbook (1). For further detail, refer to the guideline report methodology section (2). High quality= no downgrades, or observational evidence* with ≥2 upgrades; moderate quality= one downgrade, or observational evidence* with 1 upgrade; low quality= two downgrades, or observational evidence* with no upgrades; very low quality= ≥3 downgrades, or observational evidence* with ≥1 downgrade. *For topics where RCT evidence was sought, observational evidence is downgraded to low quality at the outset. [a]Only for observational evidence without downgrades for the subsequent five domains.

## Risk factors for severe illness

Clinicians should take into account the following risk factors for more serious illness when assessing and managing infants with bronchiolitis:

- Gestational age <37 weeks*;
- Younger chronological age at presentation*;
- Prenatal and/or postnatal exposure to tobacco smoke*;
- Reduced breastfeeding exposure*;
- Faltering growth/ slow weight gain (failure to thrive);
- Comorbidities including congenital heart disease, chronic lung disease, chronic neurological condition, congenital diaphragmatic hernia, trisomy 21, and other genetic disorders;
- Being an Indigenous infant†;
- Being an economically disadvantaged infant;
- Timing and severity of illness onset at hospital presentation.

*Clinicians should judge these as risk factors on a continuous scale; with higher risk of poor outcomes associated with lower gestational age, lower chronological age, fewer days of breastfeeding exposure, and greater tobacco smoke exposure.

†Indigenous status, in itself, is unlikely to confer risk but there remains a correlation in Australia and Aotearoa New Zealand with ethnicity and severe bronchiolitis outcomes, independent of socioeconomic status, potentially reflecting the ongoing impacts of colonisation, remote geographical isolation and the institutional racism in our health systems.

*(Evidence quality:* moderate; *recommendation strength:* strong)

Infants with any of these risk factors are more likely to deteriorate rapidly and require escalation of care. Risk factors are likely to be cumulative. Infants with bronchiolitis presenting with these risk factors may require a longer period of observation or hospital admission, even if they are presenting early in the illness with mild symptoms.

### SARS-CoV-2 co-infection

SARS-CoV-2 infection or co-infection does not appear to place infants at increased risk of severe outcome from bronchiolitis. Do not routinely use SARS-CoV-2 status to stratify increased risk for deterioration in infants with bronchiolitis. *(Evidence quality:* very low*; recommendation strength:* weak)

## Investigations

In most infants presenting to hospital and/or hospitalised with bronchiolitis, no investigations are required. Guidance for the use of chest Xray (CXR), laboratory and virological testing are outlined below.

### Chest Xray

Do not routinely use CXR in infants presenting or admitted to hospital with bronchiolitis. (*Evidence quality*: very low; *recommendation strength*: conditional)

CXR may be considered in the following situations:

1. Infants with an unexpected deterioration* (defined as an unexpected requirement for an escalation of care), and/or a clinical course not consistent with bronchiolitis, including concerns regarding the presence of sepsis, pneumonic consolidation, pneumothorax, empyema, immunodeficiency, pleural effusion, or significant cardiac abnormalities. (*Evidence quality*: NA;

*recommendation strength*: consensus-based)

*The following are not considered "unexpected deterioration": gradual development of an oxygen requirement, increased work of breathing, and/or the need for humidified high flow (HF) therapy in the first few days of illness.

2. In infants presenting with bronchiolitis in high dependency unit (HDU) or ICU settings, where there is clinician diagnostic concern regarding possible sepsis, pneumonic consolidation, pneumothorax, empyema, immunodeficiency, pleural effusion, or significant complication of other diseases (e.g., heart failure with congenital heart disease), in order to guide treatment options. (*Evidence quality*: NA; *recommendation strength*: consensus-based)

### Laboratory tests

Do not routinely use laboratory tests for infants presenting or admitted to hospital with bronchiolitis, including bacteriological testing of urine or blood. (*Evidence quality*: very low; *recommendation strength*: conditional)

However, clinicians may consider glucose and/or sodium levels during assessment in infants with bronchiolitis and poor feeding, evidence of dehydration or altered mental state. (*Evidence quality*: NA; *recommendation strength*: consensus-based)

Clinicians may consider using biomarkers (full blood count, C-reactive protein, procalcitonin) and blood cultures to inform diagnoses of serious bacterial co-infection in the following groups:

1. Infants with an unexpected deterioration (defined as an unexpected requirement for an escalation of care) during their hospitalisation with bronchiolitis. (*Evidence quality*: NA; *recommendation strength*: consensus-based).

2. Infants admitted to the ICU with bronchiolitis. (*Evidence quality*: very low; *recommendation strength*: weak).

Urine testing may also be considered to inform a diagnosis of serious bacterial co-infection in infants with an unexpected deterioration during hospitalisation for bronchiolitis.

### Virological tests

Do not routinely use viral testing in infants presenting or admitted to hospital with bronchiolitis, including testing undertaken solely for cohorting of patients. (*Evidence quality*: very low; *recommendation strength*: conditional)

This recommendation is separate from the requirements for virological testing that hospitals may have. Routine viral testing is unlikely to provide benefit to individual infants but provides epidemiological data.

## Management

### Monitoring

Observations as per local hospital guidelines and Early Warning Tools (EWTs) are appropriate for monitoring infants with bronchiolitis.

Do not routinely use a formal bronchiolitis severity scoring system to predict need for hospital admission or length of stay in infants presenting or admitted to hospital with

bronchiolitis. (*Evidence quality*: very low; *recommendation strength*: weak)

Do not routinely use continuous pulse oximetry for medical management of non-hypoxaemic infants with bronchiolitis who are not receiving supplemental oxygen, or in stable infants receiving low flow oxygen therapy, who are not at risk of apnoea. (*Evidence quality*: moderate; *recommendation strength*: conditional)

## Respiratory support

### *Supplemental oxygen*

Consider use of supplemental oxygen in the treatment of hypoxaemic infants with bronchiolitis. (*Evidence quality*: low; *recommendation strength*: conditional)

Supplementary oxygen should not be used for work of breathing alone.

### *Oxygen saturation targets*

Supplemental oxygen therapy should be considered in infants with bronchiolitis when oxygen saturation levels meet the following criteria:

- For otherwise healthy infants aged ≥6 weeks: Peripheral oxygen saturation ($SpO_2$) persistently <90%.
- For infants aged <6 weeks, or infants aged <12 months with an underlying health condition: $SpO_2$ persistently <92%.

(*Evidence quality*: low; *recommendation strength*: weak)

Infants with bronchiolitis may have brief episodes of mild or moderate desaturations to levels below these thresholds, particularly during sleep. These brief desaturations are not a reason to commence oxygen therapy. Interpretation of 'persistently less' should be considered in light of the stage at which the child is in the disease course and whether the child is awake or asleep. Oxygen saturation targets are not considered alone for decision-making and are one of many data-points. They should be considered in light of the full disease picture involving other factors such as need for supplemental feeding, day of illness, and underlying risk factors.

When used, supplementary oxygen should be discontinued when oxygen saturations are persistently greater than or equal to the appropriate threshold outline (90% or 92%) (see Figure 2 for guidance on observation periods). Oxygen saturations should be tested and monitored every 4 to 6 hours, according to institutional policy.

### *Humidified high flow (HF) therapy*

Do not routinely use HF therapy in infants with mild or moderate bronchiolitis who are not hypoxaemic.* (*Evidence quality*: low; *recommendation strength*: conditional)

Infants with moderate work of breathing are suitable to be on the ward with appropriate nursing ratios.

Do not routinely use HF therapy as a first-line therapy in infants with moderate bronchiolitis who are hypoxaemic.* (*Evidence quality*: low; *recommendation strength*: conditional)

Consider HF therapy in infants with bronchiolitis who are hypoxaemic,* and who have failed low flow oxygen. (*Evidence quality*: low; *recommendation strength*: conditional)

Consider HF therapy in infants with bronchiolitis with severe disease prior to continuous positive airway pressure (CPAP). (*Evidence quality*: low; *recommendation strength*: conditional)

*For otherwise healthy infants aged ≥6 weeks: $SpO_2$ persistently <90%. For infants

aged <6 weeks, or infants <12 months with an underlying health condition: $SpO_2$ persistently <92%. Low flow oxygen failure is defined as a lack of response to therapy (determined by a lack of reduction in respiratory rate, heart rate, or a paediatric early warning score within 4-5 hours of commencing therapy), and/or the onset of severe respiratory distress.

A flow chart to inform the use of HF therapy is presented in Figure 1. See the *supplemental oxygen* section (pg 12) for criteria for hypoxaemia.

### *Continuous positive airway pressure (CPAP)*

CPAP therapy can be considered for use in infants with bronchiolitis and impending or severe respiratory failure, and/or with severe illness. (*Evidence quality*: very low; *recommendation strength*: conditional)

## Medication

### *Beta2 agonists*

Do not use beta2 agonists in infants (<12 months of age) presenting or admitted to hospital with bronchiolitis. (*Evidence quality*: moderate; *recommendation strength*: strong)

Do not use beta2 agonists in infants (<12 months of age), presenting or admitted to hospital with bronchiolitis with a personal or family history of atopy, outside of a randomised controlled trial (RCT). (*Evidence quality*: very low; *recommendation strength*: strong)

### *Adrenaline/epinephrine*

Do not use adrenaline/epinephrine in infants presenting or admitted to hospital with bronchiolitis. (*Evidence quality*: low; *recommendation strength*: strong)*

*Refer to the 'Combined corticosteroid and adrenaline/epinephrine' therapy section for guidance on use of combined therapy.

### *Glucocorticoids*

Do not use glucocorticoids (systemic or local) in infants with bronchiolitis*. (*Evidence quality*: low; *recommendation strength*: strong)

*For guidance on the use of glucocorticoids when SARS-CoV-2 infection is present, refer to '*Treatment of SARS-CoV-2 co-infection*' on pg 14.

Do not use glucocorticoids for the routine treatment of infants with bronchiolitis and a positive response to beta2 agonists or other markers of a latter asthmatic phenotype outside of an RCT. Beta2 agonists should not be used in infants <12 months of age. (*Evidence quality*: NA; *recommendation strength*: strong)

### *Combined corticosteroid and adrenaline/epinephrine therapy*

Do not routinely use a combination of systemic or local corticosteroids and adrenaline/epinephrine in infants presenting or admitted to hospital with moderate bronchiolitis outside of the ICU setting (*evidence quality*: moderate; *recommendation strength*: conditional). A combination of systemic or local corticosteroids and adrenaline/epinephrine may be considered in infants with severe bronchiolitis requiring ICU level care. (*Evidence quality:* moderate; *recommendation strength*: conditional)

### *Hypertonic saline*

Do not routinely use nebulised hypertonic saline in infants presenting or admitted to hospital with bronchiolitis outside of an RCT. (*Evidence quality*: low; *recommendation strength*: weak)

### *Antibiotic medication*

Do not routinely use antibiotic medication for the treatment of infants with bronchiolitis. (*Evidence quality*: very low; *recommendation strength*: conditional)

Do not routinely use azithromycin for the treatment of bronchiolitis in infants admitted to hospital. (*Evidence quality*: low; *recommendation strength*: weak)

Additionally, do not routinely use antibiotics for the treatment of bronchiolitis in infants at risk of developing bronchiectasis due to known risk factors such as virus type (e.g., Adenovirus), Indigenous ethnicity, or socioeconomic disadvantage. (*Evidence quality*: very low; *recommendation strength*: weak)

#### *Treatment of SARS-CoV-2 co-infection*

For hypoxaemic infants with bronchiolitis and SARS-CoV-2 infection, consider use of dexamethasone. (*Evidence quality*: NA; *recommendation strength*: consensus-based)

For immunosuppressed infants with bronchiolitis and SARS-CoV-2 infection, consider use of remdesivir. (*Evidence quality:* NA; *recommendation strength*: consensus-based)

### Nasal suction

Do not routinely use nasal suction in the management of infants with bronchiolitis. (*Evidence quality*: low; *recommendation strength*: conditional)

However, superficial suctioning may be considered in infants with respiratory distress or feeding difficulties from upper airway secretions. (*Evidence quality:* low; *recommendation strength*: conditional). Superficial suctioning refers to suctioning of the nose.

Additionally, one off suctioning may be performed prior to oxygen supplementation to increase patient comfort and avoid clogging of nasal prongs.

Do not routinely use deep nasal suctioning for the management of infants with bronchiolitis. (*Evidence quality*: low; *recommendation strength*: weak). Deep suctioning refers to any suctioning beyond the nose, such as the nasopharynx.

### Nasal saline

Do not routinely use nasal saline drops in the management of infants with bronchiolitis. (*Evidence quality*: very low; *recommendation strength*: conditional)

A trial of intermittent nasal saline drops could be considered at the time of feeding in infants with reduced feeding. (*Evidence quality:* very low; *recommendation strength*: conditional)

### Chest physiotherapy

Do not routinely use chest physiotherapy in infants with bronchiolitis. (*Evidence quality*: low; *recommendation strength*: conditional)

### Hydration/ nutrition

Supplemental hydration should be provided to infants with bronchiolitis who cannot maintain hydration orally. (*Evidence quality*: NA; *recommendation strength*: strong)

Hydration status may be considered inadequate by reported <50% of normal intake, or evidenced by 5% weight loss or hypernatremia (if tested).

After treatment of hypoxaemia, feeding is often improved.

When supplemental hydration is required, either nasogastric (NG) or intravenous (IV) routes are appropriate (*Evidence quality*: moderate; *recommendation strength*: strong). However, the NG route should be the preferred first method. (*Evidence quality:* moderate; *recommendation strength*: weak). Consider either continuous or bolus methods of NG hydration using oral rehydration solution/breast milk or formula. (*Evidence quality:* moderate; *recommendation strength*: conditional).

Consider fluid restriction at 50-75% of normal weight-based fluid calculation for age over 24 hours to avoid fluid overload in infants with bronchiolitis. Careful monitoring of signs of over-hydration (facial and eye-lid oedema, weight increase) and under-hydration are needed. (*Evidence quality*: NA; *recommendation strength*: consensus-based)

There is a risk of increased antidiuretic hormone secretion and hyponatremia.

Consider enteral feeding (NG or oral) in infants receiving HF therapy, if tolerated (*evidence quality*: very low; *recommendation strength*: weak). Continuous NG feeding can be considered in infants receiving CPAP therapy who are not judged to be at imminent risk of intubation. (*Evidence quality:* very low; *recommendation strength*: consensus-based)

In infants requiring IV hydration, consider using either 0.9% sodium chloride (normal saline) with 5% glucose, or balanced fluid (e.g., Plasma-lyte 148™ or Hartmann's solution) with 5% glucose, for use as maintenance fluid in infants admitted to hospital with bronchiolitis requiring IV hydration. For infants aged up to 4 weeks corrected with bronchiolitis, consider 10% glucose, or monitoring of blood sugar levels if receiving 5% glucose. (*Evidence quality*: NA; *recommendation strength*: consensus-based)

### Safety initiatives

Hand hygiene practices should be followed during the management of infants with bronchiolitis (*evidence quality*: very low; *recommendation strength*: strong). Cohorting of infants admitted to inpatient wards (*Evidence quality:* very low; *recommendation strength*: weak), and multicomponent infection control practices may be considered (e.g., cohort nursing, gowns, gloves, face masks, family education). (*Evidence quality:* very low; *recommendation strength*: weak)

## Discharge-planning and community-based management

For infants with bronchiolitis, safe discharge from the hospital (ED or ward) should take into account risk factors for severe illness (see pg 10), the distance of the family's residence from the hospital, their ability to return, parental health literacy, and the timing of the hospital presentation relative to the natural history of bronchiolitis.

Infants should be considered as safe for discharge from hospital when the criteria are met from Figure 2. These criteria incorporate clinical stability, oxygen saturation and support requirements, feeding difficulties, parent/caregiver ability to manage the illness from home and education on deterioration, the social situation of the family, and arrangement of local follow-up where appropriate. (*Evidence quality*: very low; *recommendation strength*: weak)

### Education (parent/ caregiver)

A bronchiolitis information sheet (in writing or electronic) should be provided to parents and caregivers. Parents and caregivers should be educated about the illness, the expected progression, and when and where to seek further medical care if needed.

## Prevention of RSV bronchiolitis

### Infant monoclonal antibody vaccination

Consider providing monoclonal antibody prophylaxis (nirsevimab or palivizumab) during the RSV season to infants at increased risk of severe complications from bronchiolitis (due to the presence of chronic lung disease, congenital heart disease, or birth at <32 weeks' gestational age). (*Evidence quality*: moderate; *recommendation strength*: conditional)

Nirsevimab provides long-acting protection (6 months) from one dose. Palivizumab provides

short-acting protection (1 month) and requires 5 to 6 monthly doses during the RSV season.

Consider universal nirsevimab as a population-based approach to reduce morbidity due to RSV bronchiolitis. (*Evidence quality:* moderate; *recommendation strength*: conditional)

### Maternal active RSV immunisation

Consider universal maternal antenatal immunisation with an RSV prefusion F protein-based vaccine as a population-based approach to reduce morbidity from RSV bronchiolitis. (*Evidence quality*: moderate; *recommendation strength*: conditional)

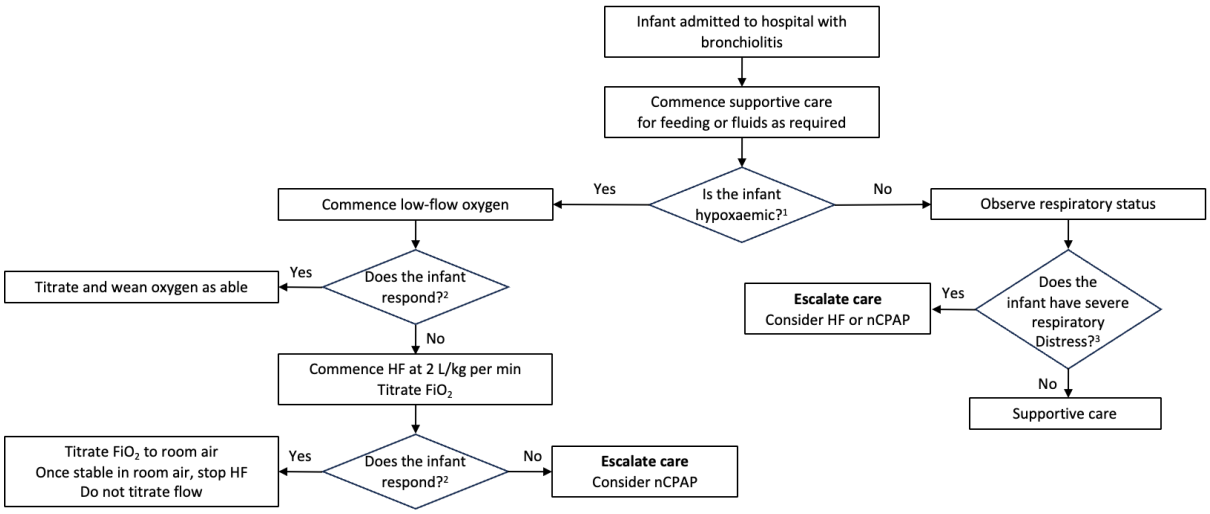
### Infant active RSV immunisation

This recommendation refers to the use of active RSV vaccines for infants and excludes passive vaccines (monoclonal antibodies). For guidance on use of monoclonal antibodies, refer to the 'infant monoclonal antibody' section (pg 15).

Do not routinely use universal infant RSV immunisation. (*Evidence quality*: low; *recommendation strength*: weak)

At the time of publication, there is no approved active infant vaccine candidate for RSV in infants in Australasia.

*Figure 1. An evidence-based approach to the use of high flow (HF) therapy in infants with bronchiolitis.*[1]




$FiO_2$ = fractional concentration of inspired oxygen; HF = Humidified high flow; nCPAP = nasal continuous positive airway pressure.

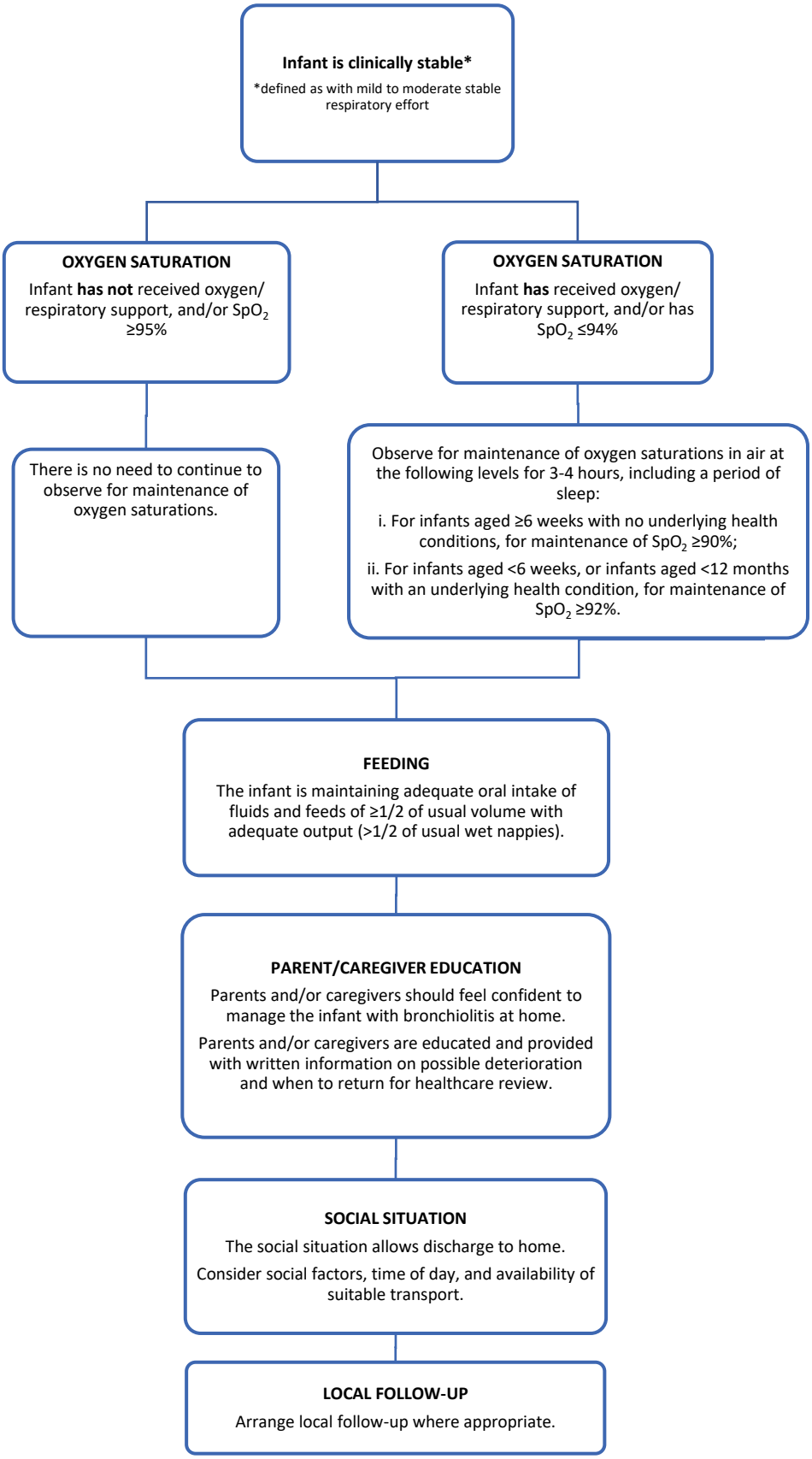
[1]For otherwise healthy infants aged ≥6 weeks: $SpO_2$ persistently <90%. For infants aged <6 weeks, or infants <12 months with an underlying health condition: $SpO_2$ persistently <92%.

[2]Response to therapy (low-flow or HF oxygen therapy) is determined by a reduction in respiratory rate, a reduction in heart rate, or a paediatric early warning score within 4-5 hours of commencing therapy.

[3]If at any time, the infant has severe respiratory distress, escalate care. Respiratory distress is a subjective finding. Severe respiratory distress is a level where a senior clinician determines that escalation in care is required, transferring the patient to the emergency department resuscitation area, paediatric ward resuscitation area, high dependency unit, or intensive care unit. Junior staff should escalate concerns regarding severe respiratory distress to senior colleagues.

[1] Reused from: Dalziel SR, Haskell L, O'Brien S, Borland ML, Plint AC, Babl FE, et al. Bronchiolitis. Lancet. 2022;400(10349):392-406.

*Figure 2. Criteria for safe discharge of infants with bronchiolitis from the emergency department and inpatient ward.*




$SpO_2$= Peripheral oxygen saturation.

## Initial illness severity assessment

Throughout the guideline, the terms mild, moderate, and severe are used with regards to the clinical condition of the infant with bronchiolitis. Within the research literature, the definition of these subgroups varies. Further, the definition of these terms varies between individual clinicians and healthcare settings. The evidence for bronchiolitis diagnosis and management is largely based on observational studies or RCTs which have occurred in the ED, inpatient paediatric wards, or in the ICU.

To define mild, moderate, and severe disease, a pragmatic definition has been developed that is consistent with the inclusion and exclusion criteria from the majority of the evidence (Table 2). This table is intended to serve as a reference point to help define and guide assessments of illness severity. It may also be used to clarify definitions of mild, moderate, and severe bronchiolitis used in the guideline recommendations.

*Table 2. Severity of bronchiolitis based on the initial assessment.*

| **Severity** | **Mild** | | **Moderate** | | **Severe** |
|---|---|---|---|---|---|
| **Behaviour** | Normal | | Some/intermittent irritability | | Increasing irritability and/or lethargy fatigue |
| **Respiratory rate (/min)** | <50 | | 50-59 | 60-69 | ≥70 |
| **Use of accessory muscles** | Nil to mild chest wall retraction | | Moderate chest wall retractions<br>Moderate tracheal tug<br>Moderate nasal flaring | | Marked chest wall retractions<br>Marked tracheal tug<br>Marked nasal flaring |
| **Oxygen saturations** for those <6/52 or ≥6/52 with underlying chronic disease | Persistent $SpO_2$ ≥95% | Persistent $SpO_2$ 92-94% | Initial $SpO_2$ 87-91% and hypoxaemia corrected by low flow $O_2$ | | Hypoxaemia not corrected by low flow $O_2$<br>or<br>initial $SpO_2$ <87% |
| **Oxygen saturations** for those ≥6/52 and no underlying chronic disease | Persistent $SpO_2$≥95% | Persistent $SpO_2$ 90-94% | Initial $SpO_2$ 85-89% and hypoxaemia corrected by $O_2$ | | Initial $SpO_2$ <85%<br>or<br>hypoxaemia not corrected by low flow $O_2$ |
| **Apnoea** | None | | Brief apnoea not requiring stimulus to resolve | | Increasingly frequent or prolonged apnoea |

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| **Heart rate (/min)** | <160 | | 160-169 | 170-179 | ≥180 |
| **Feeding** | Maintaining adequate oral intake of fluids and feeds. At least 1/2 of usual volume with adequate output (>1/2 of usual wet nappies) | | Not maintaining adequate oral intake of fluids and feeds <1/2 of usual volume with inadequate output (<1/2 of usual wet nappies)<br><br>and/or<br><br>≤5% dehydrated | | Infant not able to feed >20% of normal volume<br><br>and/or<br><br>>5% dehydrated |
| **Early warning score zone**[1] | White | | Yellow/Orange | | Red/Purple |

[1] *Note, early warning scores have been developed and validated for use in inpatient settings and not in EDs. $SpO_2$= Peripheral oxygen saturation.* This table is meant to provide guidance in order to stratify. The more symptoms the infant has in the moderate to severe categories, the more likely they are to have moderate or severe disease.

## What level of care is required for infants with bronchiolitis?

Within Australia and Aotearoa New Zealand, management of bronchiolitis is such, that while tertiary children's hospitals may see patients who move through the various levels of care from ED to inpatient ward to ICU based on the settings that the studies have occurred in, this may not be reflective of care in metropolitan, regional and rural hospitals, where most infants with bronchiolitis are seen. In these hospitals, bronchiolitis patients with severe disease may be managed for some time in an ED or inpatient paediatric ward prior to transfer to a tertiary children's hospital ICU or managed in an adult ICU without transfer. Transfer should occur safely according to local protocols.

The appropriate setting for delivery of care should reflect resources and skills that are available, rather than a specific physical location or label.

- Standard nursing ratios in the ED and ward environment are suitable for infants with mild or moderate bronchiolitis (Table 2).
    - For mild disease, no hydration or respiratory support is required, and these infants are usually managed in ED and as an outpatient.
    - For moderate disease, hydration support and/or oxygen therapy (low flow or HF oxygen) can be safely delivered in an ED or ward environment with standard nursing ratios.
- Standard nursing ratios in the ED and ward environment have been shown to be safe for stable infants on HF therapy.
- Severe bronchiolitis (Table 2) requires either a 1:1 or 1:2 nursing ratio. This will usually require HDU/ICU care, or escalation to a higher level of care depending on the health facility, and may involve transport to an HDU/ICU or higher-level facility. Post stabilisation of severe bronchiolitis with improvement in condition, nursing ratios can be revised.

## Summary of key changes in the recommendations between the 2016 guideline and the 2025 update

This section presents a summary of key changes in the recommendations between the 2016 Australasian Bronchiolitis Guideline and the 2025 update. A summary of the changes and the original recommendations are presented.

*Table 3. Summary of key changes in the recommendations*

| TOPIC | NO. | CHANGE | SUMMARY of CHANGES | 2016 RECOMMENDATION |
|---|---|---|---|---|
| Physical exam and history | 1 | ✓ | The key clinical signs and symptoms of bronchiolitis have not changed. However, additional clinical signs and symptoms have been added to the recommendation: feeding difficulties, vomiting, dehydration, hypoxaemia, lethargy, uncommonly (<5%) diarrhoea, and rarely (<2%) apnoea. | *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.*<br><br>*(NHMRC: C, GRADE: Weak)* |
| Risk factors | 2 | ✓ | Additional risk factors have been added to the recommendation, including the presence of trisomy 21, economic disadvantage, CDH, other genetic disorders, and the timing of illness onset at hospital presentation.<br><br>In the 2025 update, clinicians are encouraged to view gestational age, chronological age, breastfeeding and tobacco smoke exposure (pre and postnatal) as continuous risk factors (where risk of serious illness is increased with lower gestational or chronological age, less breastfeeding exposure, and more tobacco smoke exposure). | *Clinicians should consider as risk factors for more serious illness: gestational age <37 weeks; chronological age at presentation <10 weeks; exposure to cigarette smoke; breastfeeding for <2 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.*<br><br>*(NHMRC: C, GRADE: Conditional)* |
| CXR | 3b | NA | New topic to the 2025 guideline update. | NA |
| | 3c | NA | New topic to the 2025 guideline update. | NA |
| Laboratory tests | 4a | ✓ | The recommendation to perform urine testing for suspected urinary tract infection in infants with bronchiolitis and a fever was | *There is no role for blood tests in managing infants presenting to hospital and hospitalised with bronchiolitis. Routine* |

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| | | | removed to reflect the updated evidence.<br><br>However, urine tests may be considered to inform diagnoses of serious bacterial co-infection in infants with unexpected deterioration (see R4b).<br><br>The recommendation was updated to report that glucose and/or sodium levels may be considered during assessment in infants with bronchiolitis and poor feeding, evidence of dehydration or altered mental state. | *bacteriological testing of blood and urine is not recommended.*<br><br>*In infants <2 months of age presenting to hospital or hospitalised with bronchiolitis with a temperature >38 degrees, there is a low risk of UTI. If clinical uncertainty exists, clinicians may consider collecting a urine sample for microscopy, culture, and sensitivity looking for the concurrent presence of UTI.*<br><br>*(NHMRC: D, GRADE: Conditional)* |
| | 4b | NA | New topic to the 2025 guideline update. | NA |
| | 4c | NA | New topic to the 2025 guideline update. | NA |
| Criteria for safe discharge | 7 | ✓ | In the 2025 update, a prescriptive discharge criteria and flow chart was developed. The criteria for safe discharge were revised to include specific oxygen saturation targets and indicators of adequate feeding, and the criteria were tailored to ED and ward discharge. Additional detail on the social factors surrounding discharge, such as parent/caregiver education on bronchiolitis and confidence to manage bronchiolitis from home, transport, and arrangement of local follow-up (if needed) were added. | *Oxygen saturations, adequacy of feeding, age (infants <8 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*<br><br>*(NHMRC: Practice Point, GRADE: Weak)* |
| Glucocorticoids | 11c | ✓ | The 2025 update states that combined glucocorticoid and adrenaline/epinephrine therapy may be considered in infants with severe bronchiolitis who are requiring ICU level care.<br><br>The 2025 guidance is otherwise consistent with the 2016 guideline in advising against the routine use of combined therapy in infants | *Do not administer a combination of systemic or local glucocorticoids and adrenaline/epinephrine to infants presenting to hospital or hospitalised with bronchiolitis.*<br><br>*(NHMRC: D, GRADE: Weak)* |

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| | | | with moderate bronchiolitis outside of the ICU setting. | |
| Saturation targets | 12b | ✓ | In the 2025 update, it is recommended to use supplemental oxygen in infants with bronchiolitis if $SpO_2$ is persistently <90% in infants aged ≥6 weeks.<br><br>For infants <6 weeks of age, or <12 months of age with an underlying health condition, supplemental oxygen should be used if $SpO_2$ is persistently <92%. | *In uncomplicated bronchiolitis oxygen supplementation should be commenced if the oxygen saturation level is sustained at a level <92%. At oxygen saturation levels of 92% or greater, oxygen therapy should be discontinued.*<br><br>*(NHMRC: C, GRADE: Conditional)* |
| Non-oral hydration | 20b | ✓ | In the updated recommendation, further detail was provided on the types of NG hydration that may be given. Clinicians can consider either continuous or bolus methods of NG non-oral hydration with oral rehydration solution, breast milk, or formula in infants admitted to hospital with bronchiolitis requiring an NG. NG is the preferred first method of non-oral hydration in infants with moderate bronchiolitis requiring supplemental hydration. | *Both NG and IV routes are acceptable means for non-oral hydration in infants admitted to hospital with bronchiolitis.*<br><br>*(NHMRC: B, GRADE: Strong).* |
| | 20c | ✓ | The recommendation has been updated to provide more specific guidance on fluid restriction. Clinicians can consider fluid restriction at 50-75% of recommended maintenance due to the risk of fluid overload from SiADH, and hyponatremia in bronchiolitis. Clinicians are also encouraged to monitor for signs of overhydration. | *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 required and regular review is recommended*<br><br>*(NHMRC: Practice point, GRADE: Weak).* |
| | 20d | NA | New topic to the 2025 guideline update. | NA |
| | 20e | NA | New topic to the 2025 guideline update. | NA |
| Infection control practices | 21 | ✓ | In addition to hand hygiene practices and cohorting of patients in wards, the 2025 update recommends that multicomponent infection control measures may be considered | *Hand hygiene is the most effective intervention to reduce hospital acquired infections and is recommended. There is inadequate evidence for* |

| | | | | |
|---|---|---|---|---|
| | | | while managing infants with bronchiolitis (e.g., use of gowns, masks). | *benefits in cohorting infants with bronchiolitis.*<br><br>*(NHMRC: D, GRADE: Weak)* |
| SARS-CoV-2 co-infection | 22a | NA | New topic to the 2025 guideline update. | NA |
| SARS-CoV-2 treatment | 22b | NA | New topic to the 2025 guideline update. | NA |
| Monoclonal antibody therapy | 23 | NA | New topic to the 2025 guideline update. | NA |
| Maternal RSV immunisation | 24 | NA | New topic to the 2025 guideline update. | NA |
| Infant RSV immunisation | 25 | NA | New topic to the 2025 guideline update. | NA |

*Note.* The recommendations were not reported as changed in instances where there were minor changes to the wording of the recommendation, but the recommended action had not changed. For details of all recommendations, refer to *Table 6: recommendations from the 2025 Australasian Bronchiolitis Guideline update*.

CDH = Congenital diaphragmatic hernia; ED = Emergency department; GRADE = Grading of Recommendations Assessment, Development and Evaluation; ICU = Intensive care unit; IM = Intramuscular; IV = Intravenous; NG = Nasogastric; NHMRC = National Health and Medical Research Council; RSV = Respiratory syncytial virus; SARS-CoV-2 = Severe acute respiratory syndrome coronavirus 2; SiADH = Syndrome of inappropriate antidiuretic hormone secretion; UTI = Urinary tract infection.

# Introduction

Bronchiolitis is one of the most common reasons for hospital admission in Australian and Aotearoa New Zealand infants (3, 4). Bronchiolitis is an acute respiratory condition that occurs seasonally in winter in temperate regions and typically affects infants <12 months of age (5). It most often occurs with RSV infection (6). Bronchiolitis begins with signs of an upper respiratory tract infection (e.g., rhinorrhoea, nasal congestion, cough), followed by signs of a lower respiratory tract infection, including respiratory distress and the presence of diffuse crackles and/or wheeze on auscultation. Moderate and severe bronchiolitis may involve hypoxaemia, apnoea, increased respiratory rate and use of accessory muscles, feeding difficulties, increased heart rate, and irritability or lethargy. Indigenous infants, and infants with comorbidity (e.g., congenital heart disease, chronic lung disease, neuromuscular disorders), prematurity, exposure to tobacco smoke and limited breastfeeding have been shown to be at greater risk of severe illness requiring escalation of care (6).

To inform the management of infants presenting to hospital or hospitalised with bronchiolitis in Australasia, the Paediatric Research in Emergency Departments International Collaborative (PREDICT) developed the first Australasian Bronchiolitis Guideline in 2016 (7, 8). The guideline was prompted by the lack of Australasian specific, evidence-based guidance on the management of infants with bronchiolitis, and data indicating variation in clinical practice in this setting (9, 10). The 2016 guidance provided 31 recommendations covering 22 investigations and therapies for the diagnosis and management of infants with bronchiolitis in Australasian hospitals.

In 2022, a guideline update was initiated to incorporate new evidence since the initial guideline. The scope was expanded in this 2025 update to include new topics on preventative therapies for RSV (e.g., monoclonal antibody prophylaxis, maternal and infant RSV immunisation), SARS-CoV-2 co-infection and treatment and to provide recommendations for ICU level care (defined as care provided up to the point of intubation and mechanical (invasive) ventilation). The 2025 update provides 41 recommendations covering 25 investigations and therapies for bronchiolitis and RSV prevention.

## Target audience

The target audience of this guideline are clinicians based in EDs, general paediatric wards, and ICUs in tertiary and urban, suburban, and regional hospitals in Australia and Aotearoa New Zealand, who are managing the care of infants with bronchiolitis.

## Aims and objectives

This guideline aims to provide evidence-based clinical guidance for the management of infants (aged <12 months) with bronchiolitis, who have presented to an ED, or who have been admitted to a general paediatric ward or ICU (requiring treatment up to the point of mechanical ventilation) in an Australasian hospital. This report details an update to the original 2016 guideline.

# Methodology

The Australasian Bronchiolitis Guideline was prospectively registered on the Guideline International Network (GIN) library (11), and on PROSPERO (CRD42023463917) (12).

## Guideline contributors

A GAG and GDC were established by the guideline co-chairs (MB and SRD). The GAG was responsible for determining the guideline strategy and process, overseeing the evidence review, and managing the recommendation development and publication. The GAG consisted of five medical (MB, SRD, FB, LC, EO) and two nursing specialists (LH, SO) in general paediatrics and paediatric emergency medicine, and three methodology experts (KL, ET, CW) from Australia and Aotearoa New Zealand.

The GDC consisted of 19 clinical and academic experts in paediatric emergency medicine, immunology, neonatology, intensive care, general paediatrics, and general practice from Australia and Aotearoa New Zealand. The panel were chosen to ensure coverage of medical and nursing expertise in relevant subspecialities, across tertiary and regional hospitals in Australia and Aotearoa New Zealand. The panel was gender balanced, and included clinicians who provided Indigenous expertise. The GDC contributed to the guideline scope, provided feedback during the evidence review and recommendation development, and voted to finalise the recommendations. See *Annex A: Guideline Advisory Group and Guideline Development Committee* for further information on the GAG and GDC membership.

## Declarations of interest

Potential members of the GAG and GDC were required to declare conflicts of interest through a standardised declaration of interests form. Declarations were reviewed by the co-chairs (MB, SRD) and a GAG member with experience in handling guideline conflicts of interest (CW). Where conflicts were present, the GAG co-chairs and CW determined the extent of the conflict and how it would be managed (exclusion from the guideline, participation restricted, or no action required). No conflicts were significant enough to warrant exclusion from the GAG or GDC. Two GDC members were required to abstain from voting for a topic, and their conflicts of interest were declared prior to discussion of the evidence. Any new conflicts of interest were required to be declared throughout the guideline development process. Further detail on the process for handling conflicts of interest, documentation of the conflicts of interest and their management are reported in *Annex B: declarations of competing interests*.

## Development of scoping questions

Scoping questions in population, intervention, comparator, outcome (PICO) format relevant to the scope, target audience, aims and objectives were developed by the co-chairs (MB and SRD). These were subsequently refined by the GAG, and agreed upon by the GDC. Where appropriate, PICO questions from the 2016 guideline were used. Three scoping questions from the intial guideline were excluded during the update, which focused on home oxygen and beta2 agonist use in older infants (aged 12-24 months). Fourty-one PICO questions were investigated (see *PICO questions* section). For each question, the GDC agreed *a priori* on relevant critical and important outcomes to be extracted from the literature. Once the scoping questions had been finalised, GAG and GDC members were assigned to one of four topic groups based on their expertise (see *Annex A: Guideline*

*Advisory Group and Development Committee, Table A3*). Each topic group was lead by at least two GAG members.

## Evidence retrieval, assessment, and synthesis

Systematic searches were developed with and performed by a subject librarian (Royal Children's Hospital, Melbourne, VIC, Australia), using electronic databases on 19 June and 21 June 2023. The searches were repeated on 24 January 2024 to identify new literature published since the initial searches. The searches were performed on Ovid MEDLINE, Ovid EMBASE, PubMed, CINAHL, and the Cochrane Library. The results were limited to the English language and by publication date (year 2000 onwards). The systematic search strategies are presented in *Annex C: search strategy and results*. The search strategy from the 2016 guideline was adapted to include new search terms related to the expanded scope. One large systematic search covering all 25 topics was performed on each database. Supplementary searches were run for the new topics (e.g., ICU care, RSV vaccination) that were backdated to the search period of the initial guideline (2010 to 2014). The included articles of the 2016 guideline were screened for evidence on the new ICU outcomes. Manual searches were performed from the reference lists of recent bronchiolitis guidelines and systematic reviews. Trial registrations and conference abstracts were searched for full-text articles. A bibliography of the included articles was circulated to subject matter experts within the GAG and GDC to ensure no key articles were missing.

Study selection was performed in two stages involving a title and abstract screen, and a full-text screen using Covidence software (Veritas Health Innovation, Melbourne, Australia). Both stages were performed in duplicate by two of 10 independent reviewers. For the full-text screen, nine of 10 reviewers screened the articles tagged to their topic groups (MLB, SRD, EJT, FB, LC, LH, SO, EO, CW) whilst one reviewer (KL) screened across all topics. The Cochrane RCT classifier was used as a screening aid. The unique eligibility criteria for each topic is outlined in the respective evidence profile (*Annex E: evidence profiles*). Training meetings were held prior to each screening stage and inter-rater agreement was monitored. Any rating conflicts were resolved through discussion by at least one independent reviewer not involved in the dispute (MLB, SRD, KL, EJT).

Data extraction was performed by one reviewer (KL) with review by a topic expert from the GAG (MLB, SRD, EJT, FB, LC, LH, SO, EO, CW). The data were extracted into standardised spreadsheet forms. Data were extracted on the study design, country, trial location, aim, participant number and characteristics (demographics, health), enrolment setting, eligibility criteria, intervention/investigation, comparator (where applicable), methodology, outcome measurement, and results.

Where there was overlapping evidence reported across eligible systematic reviews for a topic, the most recent, comprehensive, high quality review was extracted, as per guidance from the Cochrane Handbook for Systematic Reviews of Interventions (13). This approach was taken to avoid introducing bias from double-counting outcome data. Eligible primary studies that had been reported within an included systematic review were not directly extracted from, apart from if the primary study had reported on additional guideline outcomes that were not presented within the systematic review.

## Data synthesis

The data were synthesized narratively and quantitatively through meta-analysis where appropriate using Review Manager Web software (RevMan Web) (The Cochrane Collaboration, London, United Kingdom). The criteria outlined in the Cochrane Handbook for Systematic Reviews of Interventions was used to determine whether meta-analysis was appropriate (14). A meta-analysis was considered appropriate where there were at least two studies for a comparison, where the data were completely reported and statistically homogenous, and the treatments, participants, study designs, outcomes, and underlying clinical question were sufficiently similar. Studies from the 2016 guideline were brought forward for inclusion into meta-analyses where applicable.

Where meta-analysis was appropriate, the results were quantitatively synthesized using fixed-effect or random-effects models, depending on clinical and methodological heterogeneity. A fixed-effect model was chosen where it could be reasonably assumed that the trials were estimating the same underlying treatment effect. A random-effects model was chosen where heterogeneity was sufficient to expect that treatment effects would differ between trials.

Statistical heterogeneity was assessed visually through forest plots and the $I^2$ test (0-40%: might not be important; 30-60%: may represent moderate heterogeneity; 50-90%: may represent substantial heterogeneity; 75-100%: considerable heterogeneity (15)), and was reported. The measures of treatment effect that were generated were risk ratios (RR) or odds ratios (OR) for dichotomous outcomes, and mean difference (MD) for continuous outcomes. The unit of analysis was participants in each trial arm. Intention-to-treat data were used where reported.

*Post hoc* subgroup and sensitivity analyses were performed where there were sufficient data to meaningfully explore possible sources of heterogeneity, and to assess the robustness of the results (e.g., by excluding studies based on characteristics such as high risk of bias, high withdrawal rates, a high degree of missing data, outlier trials, non-RCT designs, estimated means). If more than 10 trials were pooled for a single comparison, we planned to assess small study effects and publication bias.

Where meta-analyses were not performed, the measures of treatment effect were reported that were presented in the primary studies.

## Evidence appraisal

The risk of bias of the included studies was evaluated using tools appropriate to the evidence for a topic. The tools included the Cochrane Risk of Bias 2 (RoB2) tool (16), the Risk Of Bias In Non-randomised Studies of Interventions (ROBINS-I) tool (17), the Risk Of Bias In Non-randomised Studies – of Exposures (ROBINS-E) tool (18), the RoB2 tool for crossover trials (19), the Prediction model Risk Of Bias ASessment Tool (PROBAST) (20), the Joanna Briggs Institute (JBI) Checklist for Prevalence Studies (21), and the Newcastle Ottawa Quality Assessment Scale for Cohort Studies (22). Where systematic reviews were included, the risk of bias ratings that were reported for the included primary studies were extracted. Cost-effectiveness studies were not evaluated for risk of bias, following Cochrane Handbook guidance (23). The risk of bias appraisals were performed by one reviewer (KL), with review by topic leads from the GAG. The appraisals were performed using the standard sheet for each tool, with judgments informed by the published tool guidance. The risk of bias appraisals were visualised using Robvis software (Bristol, United Kingdom) (24), or tables, depending on the tool.

The quality and certainty of the body of evidence was assessed using the GRADE methodology and GRADEpro GDT software (McMaster University and Evidence Prime Inc, Hamilton, ON, Canada) (1, 25). Evidence quality judgments were produced by outcome, and were affected by study design and ratings across the following domains: risk of bias, inconsistency, indirectness, imprecision, other (publication bias, large magnitude of effect, plausible confounding, dose-response gradient). Each domain could be rated as not serious, serious, very serious, or extremely serious, depending on the number of levels by which a topic was downgraded. The ratings for each domain determined the overall evidence quality rating for the outcome, which could be high, moderate, low, or very low, depending on the number of downgrades. The GRADE approach for evaluating network meta-analysis evidence was followed where applicable (26-28). The GRADE appraisals were performed by one reviewer (KL), with review by topic leads from the GAG. Evidence tables were generated for each comparison within an evidence profile.

## Recommendation development

Each recommendation was developed following GRADE methodology and the evidence-to-recommendation framework (1). For each recommendation, ratings for the overall evidence quality and recommendation strength were determined. The overall rating of evidence quality for a topic was formulated from the lowest evidence quality rating of its critical outcomes, following GRADE Handbook guidance (1). The evidence quality ratings could range from high to very low. The GAG judged that for topics where mechanical ventilation was listed as a critical outcome, the evidence for this outcome should not contribute to the overall evidence quality rating. This is because the evidence for mechanical ventilation tended to be very limited and of very low quality, and had the effect of severely downgrading the overall evidence quality rating across many topics. The GAG judged that the resultant evidence quality rating did not accurately reflect the evidence quality of the majority of the evidence for these topics. As a result, the decision was taken to not include mechanical ventilation in the calculation for overall evidence quality in topics where it was listed as a critical outcome.

The recommendation strength represented the degree to which the GDC were confident that the desirable effects of the action outweighed the undesirable effects. The recommendation strength was determined through consideration of the evidence quality, the balance of associated benefits and harms, the resource implications, feasibility in the Australasian context, acceptability, values and preferences, and equity and human rights, in keeping with the evidence-to-recommendation framework. The considerations for each topic were presented in evidence-to-recommendation tables. The priority of the problem was judged to be consistently high across all topics, therefore this variable was not separately considered in each evidence-to-recommendation table. A qualitative interview study was performed to inform understandings of parental values and preferences for bronchiolitis care in Australasia (29). Table 4 describes the recommendation strength categories and their interpretations. Recommendation strength ratings could be strong, conditional, or weak. Alternatively, if no evidence was found for a topic, a consensus-based recommendation was made.

*Table 4. Definitions for the strength of recommendations.*

| Recommendation strength | Definition |
|---|---|
| Strong  | The GDC is confident that the desirable effects of the action outweigh its undesirable effects, or vice versa. Most or all individuals will be best served by the recommended course of action. |
| Weak  | The desirable effects of the action probably outweigh the undesirable effects, or vice versa, but appreciable uncertainty exists. Not all individuals will be best served by the recommended course of action. |
| Conditional  | A *weak* recommendation where the recommended course of action may depend on patient factors, resources or setting. |
| Consensus-based recommendation  | A recommendation formulated through GDC consensus in the absence of evidence, where a systematic review of the evidence was conducted as part of the search strategy. |

GDC = Guideline Development Committee.

The details of the evidence synthesis and appraisal, and recommendation development process for each topic are presented in evidence profiles (see *Annex E: evidence profiles*).

The recommendations were finalised through consensus discussion and voting of the GAG and GDC at three guideline development meetings held on 1st December 2023 (virtual), 23rd February 2024 (in-person), and 17th May 2024 (virtual). Prior to each meeting, the GDC reviewed the evidence profiles and draft recommendations. During each guideline development meeting, the evidence for each topic was presented and a discussion was held covering the components of the evidence-to-recommendation framework and the recommendation wording. The GAG and GDC then voted on the recommendations. A threshold of 80% agreement was required for a recommendation to pass. If the agreement threshold was not reached, the recommendation was revised by the GAG and re-voted on at the following guideline development meeting. Four of 25 topics required more than one round of voting (CXR, discharge criteria, glucocorticoids, nasal saline), due to requested changes to the recommendation wording. Consensus was reached on all topics.

## External review

An external review was performed to solicit feedback on the recommendations and ensure the acceptability, feasibility, and applicability of the recommendations to Australasian consumers of the guideline (clinicians, policymakers, patients and families). Feedback was sought on errors of fact, clarifications, and considerations on the conditions in which the recommendations apply or how they are implemented.

Ten colleges, five societies, and 13 hospitals and local governance groups were approached to provide consultation on the guideline. Two colleges and one hospital and local governance group were approached to provide endorsement. The organisations focused on paediatrics, emergency medicine, intensive care, and general practice in Australia and Aotearoa New Zealand. Medical and nursing organisations were approached.

A preliminary version of the report was circulated to the organisations for review. Consultation was received from five colleges, four societies, and ten hospitals and local governance groups. Four hospitals had more than one unit provide consultation. All feedback was tabulated and responded to by the GAG. Any major changes to the recommendation wording would have prompted a review by the GDC to ensure agreement. The organisations were provided with a letter documenting the response to the feedback and a copy of the finalised guideline.

## PICO questions

*Table 5. Guideline PICO questions.*

| TOPIC | NO. | QUESTION |
|---|---|---|
| **DIAGNOSIS** | | |
| Physical examination and history | 1. | In infants presenting to hospital, what factors in history and physical examination contribute to a differential diagnosis of bronchiolitis? |
| Risk factors | 2. | In infants presenting to hospital with bronchiolitis, what are the risk factors for admission or severe disease (e.g. prolonged length of hospital stay, ICU admission, and death)? |
| CXR | 3a. | In infants presenting to hospital or hospitalised with bronchiolitis, does performing a CXR, at the time of presentation or admission, beneficially change medical management or clinically relevant endpoints? |
| | 3b. | In infants who have an unexpected deterioration with bronchiolitis, does performing a CXR beneficially change medical management or clinically relevant endpoints? |
| | 3c. | In infants severely unwell with bronchiolitis (HDU/ICU level care), does performing a CXR beneficially change medical management or clinically relevant endpoints? |
| Laboratory tests | 4a. | In infants presenting to hospital or hospitalised with bronchiolitis, does performing laboratory tests (blood and/or urine), at the time of presentation or admission, beneficially change medical management or clinically relevant endpoints? |
| | 4b. | In infants who have an unexpected deterioration with bronchiolitis, does performing laboratory tests (blood and/or urine) beneficially change medical management or clinically relevant endpoints? |
| | 4c. | In infants severely unwell with bronchiolitis (HDU/ICU level care), does performing laboratory tests (blood and/or urine) beneficially change medical management or clinically relevant endpoints? |
| Virological investigations | 5. | In infants presenting to hospital or hospitalised with bronchiolitis, does performing virological investigations beneficially change medical management or clinically relevant endpoints? |
| **MANAGEMENT** | | |
| Bronchiolitis scoring systems | 6. | For infants presenting to hospital or hospitalised with bronchiolitis, does use of a bronchiolitis scoring system beneficially change medical management or clinically relevant endpoints? |

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| Criteria for safe discharge | 7. | For infants presenting to hospital or hospitalised with bronchiolitis, what criteria should be used for safe discharge? |
| Beta2 agonists | 8a.<br><br><br><br>8b. | In infants presenting to hospital or hospitalised with bronchiolitis, does administration of beta2 agonists (nebulisation, aerosol, oral or IV) improve clinically relevant endpoints?<br><br>In infants presenting to hospital or hospitalised with bronchiolitis, with a personal or family history of atopy, does administration of beta2 agonists (nebulisation, aerosol, oral or IV) improve clinically relevant endpoints? |
| Adrenaline/ epinephrine | 9. | In infants presenting to hospital or hospitalised with bronchiolitis, does administration of adrenaline / epinephrine (nebulisation, MDI, IM, or IV) improve clinically relevant endpoints? |
| Hypertonic saline | 10. | In infants presenting to hospital or hospitalised with bronchiolitis, does administration of nebulised hypertonic saline improve clinically relevant endpoints? |
| Glucocorticoids | 11a.<br><br><br><br>11b.<br><br><br><br>11c. | In infants presenting to hospital or hospitalised with bronchiolitis, does administration of systemic or local glucocorticoids (nebulisation, oral, IM or IV) improve clinically relevant endpoints?<br><br>In infants presenting to hospital or hospitalised with bronchiolitis, with a positive response to beta2 agonists, does administration of systemic or local glucocorticoids (nebulisation, oral, IM or IV) improve clinically relevant endpoints?<br><br>In infants presenting to hospital or hospitalised with bronchiolitis, does administration of the combination of systemic or local glucocorticoids (nebulisation, oral, IM or IV) and adrenaline improve clinically relevant endpoints? |
| Supplemental oxygen and saturation targets | 12a.<br><br><br>12b. | In infants presenting to hospital or hospitalised with bronchiolitis, does administration of supplemental oxygen improve clinically relevant endpoints?<br><br>In infants presenting to hospital or hospitalised with bronchiolitis, what level of oxygen saturation should lead to commencement or discontinuation of supplemental oxygen to improve clinically relevant endpoints? |
| Continuous pulse oximetry | 13. | In infants hospitalised with bronchiolitis does continuous monitoring of pulse oximetry beneficially change medical management or clinically relevant endpoints? |
| High flow therapy | 14. | In infants hospitalised with bronchiolitis does the use of high flow nasal cannula improve clinically relevant endpoints? |

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| Chest physiotherapy | 15. | In infants hospitalised with bronchiolitis, does chest physiotherapy improve clinically relevant endpoints? |
| Suctioning | 16a.<br><br>16b. | In infants hospitalised with bronchiolitis, does suctioning of the nose or nasopharynx improve clinically relevant endpoints?<br><br>In infants hospitalised with bronchiolitis, does deep suctioning in comparison to superficial suctioning beneficially improve clinically relevant endpoints? |
| Nasal saline | 17. | In infants hospitalised with bronchiolitis, does the use of nasal saline drops improve clinically relevant endpoints? |
| CPAP | 18. | In infants hospitalised with bronchiolitis, does the use of CPAP improve clinically relevant endpoints? |
| Antibiotic medication | 19a.<br><br>19b.<br><br>19c. | In infants presenting to hospital or hospitalised with bronchiolitis, does the use of antibiotic medication improve clinically relevant endpoints?<br><br>In infants presenting to hospital or hospitalised with bronchiolitis, does the use azithromycin medication improve clinically relevant endpoints?<br><br>In infants presenting to hospital or hospitalised with bronchiolitis, does the use of antibiotic medication in infants who are at risk of developing bronchiectasis, improve clinically relevant endpoints? |
| Non-oral hydration | 20a.<br><br>20b.<br><br>20c.<br><br>20d.<br><br>20e. | In infants presenting to hospital or hospitalised with bronchiolitis, does the use of non-oral hydration improve clinically relevant endpoints?<br><br>In infants presenting to hospital or hospitalised with bronchiolitis, what forms of non-oral hydration improve clinically relevant endpoints?<br><br>In infants presenting to hospital or hospitalised with bronchiolitis, does limiting the volume of non-oral hydration impact on clinically relevant endpoints?<br><br>In infants presenting to hospital or hospitalised with bronchiolitis, does the type of IV fluid impact clinically relevant endpoints?<br><br>In infants presenting to hospital or hospitalised with bronchiolitis and managed with high flow therapy, does the use of enteral nutrition (oral and non-oral) impact clinically relevant endpoints? |
| Infection control practices | 21. | In infants presenting to hospital or hospitalised with bronchiolitis, do infection control practises improve clinically relevant endpoints? |
| SARS-CoV-2 co-infection and treatment | 22a. | In infants presenting to hospital or hospitalised with bronchiolitis, to what extent does SARS-CoV-2 virus infection, or co-infection, contribute to disease incidence or severity? |

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| | 22b. | In infants presenting to hospital or hospitalised with bronchiolitis, who test positive for SARS-CoV-2, does use of therapies targeting the SAR-CoV-2 virus (steroids, antivirals) improve clinically relevant endpoints? |
| **PREVENTION** | | |
| Infant RSV monoclonal antibody prophylaxis | 23. | Which infants at risk of serious outcomes from bronchiolitis, have clinically relevant benefit from monoclonal antibody therapy (e.g. palivizumab)? |
| Maternal active RSV immunisation | 24. | Does universal maternal antenatal RSV immunisation result in clinically relevant benefit for infants? |
| Infant active RSV immunisation | 25. | Does universal infant RSV immunisation result in clinically relevant benefit? |

CPAP = Continuous positive airway pressure; CXR = Chest Xray; HDU = High dependency unit; ICU = Intensive care unit; IM = Intramuscular; IV = Intravenous; MDI = Metered dose inhaler; RSV = Respiratory syncytial virus; SARS-CoV-2 = Severe acute respiratory syndrome coronavirus 2.

# Clinical recommendations and evidence summaries

## Diagnosis

**PHYSICAL EXAMINATION AND HISTORY (Q1) - *In infants presenting to hospital, what factors in history and physical examination contribute to a differential diagnosis of bronchiolitis?***

**(R1) - Consider a diagnosis of bronchiolitis in an infant if they have an upper respiratory tract infection (rhinorrhoea/ nasal congestion, and/or cough), followed by the onset of a lower respiratory tract infection with one or more of respiratory distress (tachypnoea and/or retractions), or presence of diffuse crackles and/or wheeze, with or without the presence of fever. Additional signs and symptoms can include feeding difficulties, vomiting, dehydration, hypoxaemia, lethargy, uncommonly (<5%) diarrhoea, and rarely (<2%) apnoea.**

*Quality of the evidence:* very low
*Strength of recommendation:* weak

This recommendation was informed by evidence from the 2016 guideline and the 2025 guideline update. The 2016 guideline included low quality evidence from one systematic review and guideline (30), and two prospective observational studies (31, 32) that reported on clinical features that may inform a bronchiolitis diagnosis. Subsequently, the 2025 update included one systematic review (33), six prospective and three retrospective observational studies (34-42). The new evidence contributed low to very low quality evidence with findings that were consistent with the 2016 guideline.

Together, the evidence indicated that the following clinical signs and symptoms may be commonly observed in infants with bronchiolitis at hospital presentation: wheeze and/or crackles on auscultation, respiratory distress (tachypnoea, dyspnoea, and/or retractions), cough, fever, feeding difficulties, restlessness, vomiting, nasal discharge/ congestion, and tachycardia. However, the results were mostly derived from descriptive studies in bronchiolitis patients. Evidence is lacking on the sensitivity and specificity of specific clinical signs and symptoms for predicting a bronchiolitis diagnosis.

The GDC acknowledged the lack of a consistent international definition for bronchiolitis. The recommendation includes signs and symptoms that were consistently present in the evidence and that are in keeping with other international definitions (7, 43-45). The GDC acknowledged that clinical signs are the most important driver for diagnosing bronchiolitis, and there are no resource implications. Implementing a diagnostic strategy that does not involve routine testing may help to save resources for broader healthcare provision and allows implementation in settings of varying resource levels.

Further details on the evidence and recommendation development process are described in *Annex E: evidence profiles, chapter one: physical exam*.

**RISK FACTORS (Q2) - *In infants presenting to hospital with bronchiolitis, what are the risk factors for admission or severe disease (e.g. prolonged length of hospital stay, ICU admission, and death)?***

**(R2) - Clinicians should take into account the following risk factors for more serious illness when assessing and managing infants with bronchiolitis:**

- **Gestational age <37 weeks;***

- **Younger chronological age at presentation;***
- **Prenatal and/or postnatal exposure to tobacco smoke;***
- **Reduced breastfeeding exposure;***
- **Faltering growth/ slow weight gain (failure to thrive);**
- **Comorbidities including congenital heart disease, chronic lung disease, chronic neurological condition, congenital diaphragmatic hernia, trisomy 21, and other genetic disorders;**
- **Being an Indigenous infant†;**
- **Being an economically disadvantaged infant;**
- **Timing and severity of illness onset at hospital presentation.**

***Clinicians should judge these as risk factors on a continuous scale; with higher risk of poor outcomes associated with lower gestational age, lower chronological age, fewer days of breastfeeding exposure, and greater tobacco smoke exposure.**

†**Indigenous status, in itself, is unlikely to confer risk but there remains a correlation in Australia and Aotearoa New Zealand with ethnicity and severe bronchiolitis outcomes, independent of socioeconomic status, potentially reflecting the ongoing impacts of colonisation, remote geographical isolation and the institutional racism in our health systems.**

*Quality of the evidence:* moderate
*Strength of recommendation:* strong

This recommendation was informed by evidence from the 2016 guideline and the 2025 update. The 2016 guideline included low quality evidence from 22 observational studies that evaluated a variety of risk factors for severe bronchiolitis (46-69). Only two of these studies reported on Indigenous infants in Australasia (48, 54). The 2025 guideline update included 20 additional studies (70-89). These were 11 systematic reviews, and nine observational studies in Australasian populations. There was high to very low quality evidence across the risk factors.

The findings of the 2025 guideline evidence were consistent with the 2016 guideline and suggested that presence of the following factors may increase risk of severe bronchiolitis: chronological age at presentation <10 weeks, gestational age <37 weeks, chronic lung disease, chronic neurological disease, congenital heart disease, Indigenous ethnicity, breastfeeding exposure <2 months, and tobacco smoke exposure (prenatal and/or postnatal). In addition, the 2025 guideline identified supportive evidence for the following risk factors that were not reported in the 2016 evidence: socioeconomic disadvantage; presence of trisomy 21, congenital diaphragmatic hernia, or other genetic disorders; and timing of illness onset relative to hospital presentation. Greater than 30 days of exposure to certain environmental pollutants, including sulphur dioxide ($SO_2$) (associated with fossil fuel combustion at industrial plants) and nitrogen dioxide ($NO_2$) (associated with fossil fuel and combustion-related pollution, e.g., road traffic), was associated with increased odds of hospital admission for bronchiolitis, however there were inconsistent findings for other pollutants. There were inconsistent findings for the association between plural birth and illness severity.

The GDC determined that the risk factors for severe bronchiolitis have been well described in the research literature. The GDC acknowledged that infants with bronchiolitis who have risk factors for severe disease may require a longer observation period and may have a greater need for hospital admission. The recognition of risk factors may allow for individualised management plans, which is of benefit to the patient, their family, and the

healthcare provider. This strategy is feasible and acceptable in Australasian bronchiolitis care and would be expected to improve health equity. The GDC acknowledged the lack of evidence investigating vaping exposure as a potential risk factor for severe bronchiolitis, and the need for research on this topic.

Further information on the evidence and recommendation development process is provided in *Annex E: evidence profiles, chapter two: risk factors*.

**CHEST XRAY (Q3a) - *In infants presenting to hospital or hospitalised with bronchiolitis, does performing a CXR, at the time of presentation or admission, beneficially change medical management or clinically relevant endpoints?***

**(R3a) - Do not routinely use CXR in infants presenting or admitted to hospital with bronchiolitis.**

*Quality of the evidence:* very low
*Strength of recommendation:* conditional

**(Q3b) - *In infants who have an unexpected deterioration with bronchiolitis, does performing a CXR beneficially change medical management or clinically relevant endpoints?***

**(R3b) - Consider CXR in infants with an unexpected deterioration* and/or a clinical course not consistent with bronchiolitis, including concerns regarding the presence of sepsis, pneumonic consolidation, pneumothorax, empyema, immunodeficiency, pleural effusion or significant cardiac abnormalities.**

***Unexpected deterioration refers to an unexpected requirement for an escalation of care.** Gradual development of an oxygen requirement, increased work of breathing, and/or the need for HF therapy in the first few days of a bronchiolitis illness are not considered "unexpected deterioration."

*Quality of the evidence:* NA
*Strength of recommendation:* consensus-based recommendation

**(Q3c) - *In infants severely unwell with bronchiolitis (HDU/ICU level care), does performing a CXR beneficially change medical management or clinically relevant endpoints?***

**(R3c) - Consider CXR in infants presenting with bronchiolitis in high dependency/ intensive care settings, where there is clinician diagnostic concern regarding possible sepsis, pneumonic consolidation, pneumothorax, empyema, immunodeficiency, pleural effusion or significant complication of other diseases (e.g., heart failure with congenital heart disease), in order to guide treatment options.**

*Quality of the evidence:* NA
*Strength of recommendation:* consensus-based recommendation

R3a. Recommendation 3a was informed by evidence from the 2016 guideline, as there was no new evidence included for this topic in the 2025 update. The 2016 guideline included very low quality evidence from three systematic reviews (30, 90, 91), one narrative review (92), and two prospective observational studies (93, 94). The evidence indicated that CXR may not be of clinical value in typical bronchiolitis due to issues with diagnostic accuracy and non-specific radiological findings. CXR has been shown to increase costs and increase the risk of unnecessary antibiotic use.

The GDC concluded that routine CXR in infants presenting to hospital with bronchiolitis may lead to treatment of no benefit and

unnecessarily expose infants to radiation. Omitting routine CXRs avoids these potential harms and reduces healthcare costs, allowing resources to be diverted elsewhere. Parent or caregiver education may be required to ensure the acceptability of this strategy.

The GDC acknowledged that at times, infants presenting with bronchiolitis may have a history of possible congenital heart disease, foreign body aspiration, or chronic respiratory symptoms (>1 month of wet cough), and a CXR may be performed at the time of their bronchiolitis presentation for these reasons; these CXRs are not considered to be undertaken for the management of bronchiolitis and are appropriate. Further guidance on the appropriate indications for undertaking a CXR are available in recommendations 3b and 3c.

Recommendations 3b and 3c were new topics to the 2025 guideline update. As no eligible evidence was identified for these topics, the recommendations were developed through GDC consensus.

R3b. For recommendation 3b, the GDC agreed that in the setting of an unexpected deterioration in an infant with bronchiolitis, a CXR may be indicated to address diagnostic uncertainty where there are signs of sepsis or complications of bronchiolitis (e.g., empyema, pneumothorax, pleural effusion), or an alternative diagnosis (e.g., congenital heart disease). The GDC acknowledged that there is a risk of CXRs not clearly discriminating between bronchiolitis and other lower respiratory tract infections, which can lead to false positive diagnoses and inappropriate antibiotic treatment.

The GDC stressed that an understanding of the natural history of bronchiolitis and an "unexpected deterioration" are key to interpreting this recommendation. Gradual development of an oxygen requirement, increased work of breathing, and/or the need for HF therapy in the first few days of a bronchiolitis illness are not considered "unexpected deterioration;" rather, these are part of the natural history of bronchiolitis and in these circumstances, CXR is not recommended.

R3c. For recommendation 3c, the GDC agreed that for infants with bronchiolitis in the high dependency or intensive care setting, a CXR may be indicated to address diagnostic uncertainty where there are concerns about sepsis, complications of bronchiolitis, or an alternative diagnosis. Routine CXRs are not recommended for infants with bronchiolitis in this setting, and an understanding of the natural history of bronchiolitis is key to interpreting this recommendation.

The GDC agreed that CXRs in a high dependency or intensive care setting should be interpreted by senior experienced clinicians in the context of the child's clinical condition prior to starting antibiotics, as atelectasis is frequently misdiagnosed as consolidation and bronchopneumonia in infants with bronchiolitis.

Further details on the evidence and recommendation development process for R3a-c are available in *Annex E: evidence profiles, chapter three: chest xray*.

**LABORATORY TESTS (Q4a) - *In infants presenting to hospital or hospitalised with bronchiolitis, does performing laboratory tests (blood and/or urine), at the time of presentation or admission, beneficially change medical management or clinically relevant endpoints?***

**(R4a) – i) Do not routinely use laboratory tests for infants presenting to hospital or**

**hospitalised with bronchiolitis, including bacteriological testing of urine or blood.**

*Quality of evidence:* very low
*Strength of recommendation:* conditional

**ii) Consider glucose and/or sodium levels during assessment in infants with bronchiolitis and poor feeding, evidence of dehydration or altered mental state.**

*Quality of evidence:* NA
*Strength of recommendation:* consensus-based recommendation

**(Q4b) - *In infants who have an unexpected deterioration with bronchiolitis, does performing laboratory tests (blood and/or urine) beneficially change medical management or clinically relevant endpoints?***

**(R4b) - Consider use of biomarkers (e.g., full blood count (FBC), C-reactive protein (CRP), procalcitonin (PCT)), urine testing, and blood cultures for the diagnosis of serious bacterial co-infection for infants with unexpected deterioration* during hospitalisation with bronchiolitis.**

***Unexpected deterioration refers to an unexpected requirement for an escalation of care.** Gradual development of an oxygen requirement, increased work of breathing, and/or the need for HF therapy in the first few days of a bronchiolitis illness are not considered "unexpected deterioration."

*Quality of evidence:* NA
*Strength of recommendation:* consensus-based recommendation

**(Q4c) - *In infants severely unwell with bronchiolitis (HDU/ICU level care), does performing laboratory tests (blood and/or urine) beneficially change medical management or clinically relevant endpoints?***

**(R4c) - Consider use of biomarkers (e.g., FBC, CRP, PCT) and blood cultures for diagnosis of serious bacterial co-infection for infants being admitted to ICU with bronchiolitis.**

*Quality of evidence:* very low
*Strength of recommendation:* weak

R4a. Recommendation 4a was informed by evidence from the 2016 guideline and the 2025 update. The 2016 guideline included moderate to very low quality evidence from two systematic reviews (90, 95), one systematic review and guideline (30), one literature review (96), two prospective cohort studies (97, 98), and three retrospective cohort studies (99-101). Subsequently, the 2025 update included one additional systematic review of 18 observational studies that reported on diagnosis of UTI from urinalysis results in infants with bronchiolitis (102). The 2025 evidence was rated very low quality due to concerns about inconsistency and indirectness.

Overall, there was minimal evidence to indicate that laboratory testing use was associated with length of hospital or ICU stay, or death in infants with bronchiolitis. There was very low quality evidence investigating the prevalence and assessment of UTI in febrile infants with bronchiolitis. A recent meta-analysis found that when requiring a positive urinalysis test result for a UTI diagnosis, the prevalence estimate of UTI decreased from 3.1% (95% confidence interval (CI) 1.8% to 4.6%) to 0.8% (95% CI 0.3% to 1.4%) in infants with bronchiolitis (102). The most common definition for a positive urinalysis result was ≥10,000 cfu/mL of a single pathogen on a catheterized specimen. One retrospective study found that an elevated serum PCT level (cut off value of 1.5 g/mL at ICU admission) may be predictive of

bacterial co-infection in infants with bronchiolitis admitted to the ICU (99).

The GDC determined that blood and urine testing should not be used to inform a bronchiolitis diagnosis or understanding of illness severity. Routine blood and urine sampling in infants presenting with bronchiolitis may lead to treatment of no benefit and may increase costs and cause distress for the infant. The GDC agreed that blood and urine testing may be performed to inform differential diagnoses that are not bronchiolitis. In addition, the GDC agreed that in a seriously ill infant with possible sepsis, where bronchiolitis is part of a broad differential diagnosis, blood tests may be necessary. If there are concerns of sepsis, clinicians should follow local guidelines for sepsis investigation and management. The GDC acknowledged that there is a limitation of the evidence for this topic whereby the sample populations could contain infants with misdiagnosed bronchiolitis (e.g., sepsis).

R4b. Recommendation 4b was developed through consensus discussion of the GDC, as this was a new topic to the guideline and no eligible evidence was found. The GDC agreed that if there is a suspicion of serious bacterial co-infection in an infant with an unexpected deterioration during their bronchiolitis hospitalisation, tests for inflammatory markers, urine testing, and blood cultures should be performed. However, it was acknowledged that there is some uncertainty regarding the clinical role of biomarkers and other routine blood investigations for this subgroup. The GDC were concerned that potential overuse of investigations without rationale may result in distress for the infant and increase costs.

R4c. Recommendation 4c covered a new topic to the guideline. The recommendation was based on very low quality evidence from two prospective and two retrospective observational studies in severely unwell infants with bronchiolitis who were receiving ICU level care (103-106). The evidence was downgraded due to concerns about risk of bias and imprecision.

There was no evidence investigating the critical outcomes, length of stay and death. ICU length of stay was not found to differ on the basis of thrombocytosis (defined as a platelet count >500x109/L) (105), or monocyte-to-lymphocyte or neutrophil-to-lymphocyte ratios in severely unwell infants with bronchiolitis (106). There was very low quality evidence investigating the role of laboratory tests in diagnosing bacterial co-infection in this subgroup. A serum PCT cut off value of 1.4 ng/mL for samples taken at ICU admission has been shown to have a reasonable predictive performance for detecting invasive bacterial infection (area under the curve (AUC) 0.835 (95% CI 0.792 to 0.878)), sepsis (AUC 0.91 (95% CI 0.87 to 0.95)), and pneumonia in infants with severe bronchiolitis (AUC 0.82 (95% CI 0.77 to 0.87)) (103). However, predictive performance decreased beyond 24 hours after ICU admission. White blood cell counts (WCC) (with a cut off value of <6,400/µL) and CRP values (with a cut off of 26 mg/dL) at ICU admission were found to have lower predictive performance for bacterial co-infection compared to PCT in severely unwell infants with bronchiolitis.

The GDC acknowledged that there was limited, very low quality evidence to inform the recommendation. There is uncertainty surrounding the appropriate levels of PCT, CRP, and WCC to indicate bacterial co-infection in infants with severe bronchiolitis. However, undertaking investigations where there is a suspicion of bacterial co-infection would be beneficial to inform management in

this subgroup. Moreover, it would be feasible within the ICU environment.

Further information on the evidence and recommendation development process for this topic is available at *Annex D: evidence profiles, chapter 4: laboratory tests*.

**VIROLOGICAL INVESTIGATIONS (Q5) - *In infants presenting to hospital or hospitalised with bronchiolitis, does performing virological investigations beneficially change medical management or clinically relevant endpoints?***

**(R5) - Do not routinely use viral testing in infants presenting to hospital or hospitalised with bronchiolitis, including testing undertaken solely for cohorting of patients.**

*Quality of evidence:* very low
*Strength of recommendation:* conditional

This recommendation was based on evidence included in the 2016 guideline and the 2025 update. In the 2016 guideline, there was low quality evidence from one systematic review (90), one guideline (30), one controlled clinical trial (107), and nine prospective observational studies (50, 108-117) that assessed a variety of viral panels in infants with bronchiolitis. Subsequently, the 2025 update included very low quality evidence from one systematic review (118), one prospective cross-sectional study (119), and two retrospective observational studies (120, 121). In addition, data on ICU outcomes were extracted from one observational study that was included in the 2016 guideline (108). The evidence was downgraded due to concerns about risk of bias, inconsistency, and imprecision.

Together, the evidence compared the outcomes of infants with bronchiolitis and infection with different virus types, or infection from a single virus versus multiple viruses. The virological testing performed in the studies included polymerase chain reaction (PCR) assays, rapid immunochromatographic assays, direct fluorescent antibody (DFA) kits, and direct immunofluorescence (IF) techniques with nasopharyngeal aspirates. The samples were typically collected within the first 24 to 48 hours of hospital admission. The studies tended to assess the association between viral test results and outcomes, rather than directly evaluate the effect of testing versus not testing on outcomes.

There were inconsistent findings for the association between virological test results and hospital admissions or length of stay. Virus type and the presence of co-infection did not appear to be associated with risk of ICU admission or length of ICU stay. Neither the 2016 guideline nor the 2025 update identified any studies looking at the association between virological test results and death in infants with bronchiolitis.

The GDC determined that the evidence was insufficient to support routine virological testing as part of hospital care for infants with bronchiolitis. However, the GDC acknowledged that policies around routine testing and/or cohorting requirements at a hospital may affect practice independently of this recommendation. In addition, viral testing may be required as part of epidemiological forecasting, implementation, and surveillance of future RSV vaccinations at a population level. The GDC agreed that there is an unclear clinical benefit to performing viral tests, yet they may create patient discomfort and introduce additional costs. A recommendation to omit routine viral testing would be consistent with campaigns to reduce tests for which there is a lack of strong supporting evidence (e.g., the Choosing Wisely campaign). The GDC acknowledged that although this action is likely to be acceptable to clinicians, families can sometimes feel

reassured by viral test results and careful communication may be required.

Further information on the evidence and recommendation development process is presented in *Annex E: evidence profiles, chapter 5: virological testing*.

## Management

**BRONCHIOLITIS SCORING SYSTEMS (Q6) - *For infants presenting to hospital or hospitalised with bronchiolitis, does use of a bronchiolitis scoring system beneficially change medical management or clinically relevant endpoints?***

**(R6) - Do not routinely use a formal bronchiolitis severity scoring system to predict need for admission or hospital length of stay in infants presenting or admitted to hospital with bronchiolitis.**

*Quality of evidence:* very low
*Strength of recommendation:* weak

This recommendation was based on evidence from the 2016 guideline and the 2025 update. The 2016 guideline included very low quality evidence from ten observational studies (122-131). Subsequently, the 2025 update included very low quality evidence from seven prospective observational studies (79, 132-137) and one systematic review (from which five prospective observational studies were extracted) (138). The evidence was downgraded due to concerns about risk of bias and imprecision from small sample sizes. Most scoring systems were evaluated in one study without comparison to alternative scoring systems, and outside of an Australasian context.

Together, the evidence reported on 16 bronchiolitis scoring systems, including the Acute Lower Respiratory Infection (ALRI) score, the Bronchiolitis Score of Sant Joan de Déu (BROSJOD), a clinical disease severity score (CDSS), the Children's Hospital of Wisconsin Respiratory Score (CHWRS), the Acute Bronchiolitis Severity Scale (or Escalada de Severidad de la Bronquiolitis Aguda; EBSA), the Global Respiratory Severity Score (GRSS), the Kristjansson Respiratory Score, the Modified Tal Score (mTal), the Modified Respiratory Index (RIS), the modified Wood's Clinical Asthma Score (M-WCAS), the Respiratory Distress Assessment Instrument (RDAI), the ReSVinet scale, the Tal severity Score, the Wang Bronchiolitis Severity Score (WBSS), the Wood Downes Ferres (WDF) score, and a four-component clinical score.

Most of the evidence reported on the predictive validity of the scales in relation to hospital length of stay (79, 123, 125, 131-136, 138). Scores on the ALRI, BROSJOD, CDSS, CHWRS, GRSS, the Kristjansson Respiratory Score, mTal, mRIS, RDAI, ReSVinet, WBSS, and a four-component clinical score were positively associated with hospital length of stay in infants with bronchiolitis. There was no clear evidence to support using one tool over another. There was limited, very low quality evidence investigating each scoring system.

Only one study reported on the performance of the measures at predicting severe bronchiolitis (137). There was no significant difference in the performance of the EBSA and WDF scores at predicting severe bronchiolitis (N=201; difference in AUC: 0.02 [95% CI 0.01 to 0.15], $p$=.72). Both scores were found to have an acceptable level of accuracy (EBSA: AUC: 0.82 [95% CI 0.75 to 0.87]; WDF: AUC: 0.79 [95% CI 0.73 to 0.85]).

Although there is evidence supporting the validity of several bronchiolitis scoring systems for predicting length of stay, the GDC acknowledged that this evidence is very low quality, and there is typically only one study investigating this outcome per scoring system.

There was insufficient evidence to support the use of one scoring system over another. Bronchiolitis scoring systems have yet to be evaluated as part of routine clinical practice in Australasian hospital settings. There is the potential that inappropriate use could prolong hospital length of stay (e.g., from only discharging patients when scores are low). Bronchiolitis scoring systems are not widely used in clinical practice. They are more commonly used in clinical trials as part of the inclusion criteria or as outcomes. However, many of the scoring components require data that is routinely collected in clinical practice. Therefore, use of a scoring system is not expected to have a significant resource implication. Bronchiolitis scoring systems were expected to be acceptable to clinicians, as they involve data that is routinely collected and may assist with clinical decision making and management.

Further information on the evidence and recommendation development process for this topic is available in *Annex E: evidence profiles, chapter 6: bronchiolitis scoring systems*.

**CRITERIA FOR SAFE DISCHARGE (Q7) - *For infants presenting to hospital or hospitalised with bronchiolitis, what criteria should be used for safe discharge?***

**(R7) - Safe discharge from hospital (either from the ED or ward) for infants with bronchiolitis should take into account risk factors (R2), the distance of the family's residence from the hospital and their ability to return, parental health literacy, and the timing of the hospital presentation relative to the natural history of bronchiolitis (R1). Consider patients suitable for safe discharge from hospital when the following criteria are met:**

**1. Infant is clinically stable (defined as with mild to moderate stable respiratory effort).**

**2. For an infant who has not received oxygen/respiratory support and/or with $SpO_2$≥95%, there is no need to continue to observe for maintenance of oxygen saturations. The infant may be considered for discharge based on criteria below.**

**For an infant who has received oxygen/respiratory support and/or with $SpO_2$≤94%, they should be observed for maintenance of oxygen saturations in air at the following levels for 3-4 hours, including a period of sleep:**

**i. for infants aged ≥6 weeks with no underlying health conditions, for maintenance of $SpO_2$≥90%;**

**ii. for infants aged <6 weeks, or infants aged <12 months with an underlying health condition, for maintenance of $SpO_2$≥92%.**

**3. All Infants, irrespective of presentation to ED or on inpatient ward, should be maintaining adequate oral intake of fluids and feeds of at least 1/2 of usual volume with adequate output (>1/2 of usual wet nappies).**

**4. Parents and/or caregivers should feel confident to manage the infant with bronchiolitis at home.**

**5. Parents and/or caregivers are educated and provided with written information on possible deterioration and when to return for healthcare review.**

**6. Social situation allows discharge to home. The following factors should be considered: social factors, the time of day and suitable transport availability.**

**7. Arrange local follow-up where appropriate.**

*See Figure 2.*
*Quality of evidence:* very low
*Strength of recommendation:* weak

This recommendation was informed by evidence included in the 2016 guideline and the 2025 update. The 2016 guideline included

very low quality evidence from two multicentre, prospective cohort studies in the USA (139, 140), and three systematic reviews and guidelines (30, 141, 142). The 2025 update included low to very low quality evidence from two retrospective observational studies that compared the effects of various discharge criteria on hospital length of stay and readmission rates in infants with bronchiolitis in the USA and Australia (143, 144). The evidence was downgraded due to concerns about risk of bias, indirectness, and imprecision.

Overall, the evidence suggested that use of discharge criteria may help to avoid prolonged length of stay, without increasing readmission rates (139, 140, 143, 144). The discharge criteria that were evaluated varied between studies. The criteria tended to cover respiratory status, oxygen saturation level, an observation period following cessation of oxygen therapy (4 hours), hydration and feeding, and social factors. Only one study evaluated the effects of discharge criteria in an Australian context (144).

The GDC updated the recommendation for safe discharge criteria based on the limited available evidence, an update to the oxygen saturation level recommendation (see R12b), and recent recommendations for safe discharge in international bronchiolitis guidelines (44, 45, 145-147). The 2016 recommendation was restructured to support criteria led discharge. The GDC felt that criteria led discharge that is more prescriptive with explicit guidance may enable discharge by nurses and reduce hospital length of stay for infants with bronchiolitis. The recommended discharge criteria involve evaluating information that is routinely collected, therefore it is expected to be acceptable and feasible with minimal resource implications in Australasian hospitals. The GDC acknowledged that there is value in using clear criteria that encourages consistency in practice and supports planning.

Further information on the evidence and recommendation development process for this topic is presented in *Annex E: evidence profiles, chapter 7: criteria for safe discharge*.

**BETA2 AGONISTS (Q8a) - *In infants presenting to hospital or hospitalised with bronchiolitis, does administration of beta2 agonists (nebulisation, aerosol, oral or IV) improve clinically relevant endpoints?***

**(R8a) - Do not use beta2 agonists in infants (<12 months of age) presenting to hospital or hospitalised with bronchiolitis.**

*Quality of the evidence:* moderate
*Strength of recommendation:* strong

**(Q8b) - *In infants presenting to hospital or hospitalised with bronchiolitis, with a personal or family history of atopy, does administration of beta2 agonists (nebulisation, aerosol, oral or IV) improve clinically relevant endpoints?***

**(R8b) - Do not use beta2 agonists in infants (<12 months of age) presenting to hospital or hospitalised with bronchiolitis, with a personal or family history of atopy outside of a RCT.**

*Quality of the evidence:* very low
*Strength of recommendation:* strong

R8a. Recommendation 8a was informed by evidence included in the 2016 guideline and the 2025 update. The 2016 guideline included high quality evidence from one systematic review of 30 RCTs (148) and a subsequent RCT (149). The 2025 update included six additional studies, which were one network meta-analysis (150), one systematic review with meta-analysis (151), one RCT (152), two prospective observational studies (153, 154),

and one retrospective observational study (155). The new evidence was rated low to very low quality due to concerns about imprecision from small sample sizes and risk of bias.

The findings were largely consistent between the 2016 and 2025 guideline evidence for recommendation 8a. Together, the evidence indicated that in infants <12 months presenting to hospital or hospitalised with bronchiolitis, beta2 agonists (salbutamol) did not significantly differ from placebo in terms of the effects on hospitalisation rates, hospital length of stay, hospital readmission rates, or time on positive pressure ventilation support; however, beta2 agonists were associated with higher rates of self-limiting adverse events.

The GDC concluded that the benefits of beta2 agonists did not outweigh the possible harms in infants with bronchiolitis <12 months of age. Although it is feasible to prescribe beta2 agonists in Australasian hospitals, their uncertain benefits in this population negatively affect their acceptability for clinicians. The GDC does not support trials of beta2 agonists in this subgroup.

R8b. Recommendation 8b focused on the use of beta2 agonists in infants aged <12 months with a personal or family history of atopy, who presented to hospital or were hospitalised with bronchiolitis. Neither the 2016 guideline nor the 2025 update identified any direct evidence evaluating the use of beta2 agonists in this subgroup. One prospective observational study (154) identified in the 2025 update reported that infants with a prior diagnosis or a family history of asthma comprised a small subset of their sample. However, the results were not reported separately for this subgroup. In this study, responders to salbutamol were found to have a significantly shorter duration of mechanical ventilation (154).

The GDC agreed that beta2 agonists should not be used in infants <12 months of age with bronchiolitis and a personal or family history of atopy outside of a RCT. There is very limited evidence on the effects of beta2 agonists in this subgroup and additional research is needed.

Further details on the evidence and recommendation development process for these topics are presented in *Annex E: evidence profiles, chapter 8: beta2 agonists*.

**ADRENALINE/EPINEPHRINE (Q9) - *In infants presenting to hospital or hospitalised with bronchiolitis, does administration of adrenaline / epinephrine (nebulisation, MDI, IM or IV) improve clinically relevant endpoints?***

**(R9) - Do not use adrenaline/epinephrine in infants presenting to hospital or hospitalised with bronchiolitis.**

*Quality of the evidence:* low
*Strength of recommendation:* strong

This recommendation was informed by evidence identified in the 2016 guideline and the 2025 update. In the 2016 guideline, there was high to low quality evidence from one Cochrane systematic review of 19 RCTs (156), and five subsequent RCTs (157-161). The 2025 update included low to very low quality evidence from an additional systematic review with network meta-analysis (150) and an RCT (152). The evidence quality was downgraded due to concerns about imprecision, outcome indirectness, and risk of bias.

The findings of the evidence from the 2025 update were largely consistent with the 2016 guideline. Together, the evidence suggested that adrenaline/epinephrine may not significantly differ to placebo in terms of effects on hospital length of stay, mechanical

ventilation rates, and hospital readmission rates. However, the findings are inconsistent for the effects of adrenaline/epinephrine on hospitalisation rates in infants with bronchiolitis across the 2016 and 2025 guideline evidence. Studies at low risk of bias found no difference in the hospitalisation rates of infants who received adrenaline/epinephrine or placebo. There was no evidence investigating the effects of adrenaline/epinephrine on the duration of positive pressure ventilation support in infants with bronchiolitis. Adrenaline/epinephrine use may be associated with mild adverse events, including tachycardia, pallor, tremor, nausea, and/or vomiting.

The GDC determined that for infants with bronchiolitis, the benefits of adrenaline/epinephrine therapy did not appear to outweigh the possible harms. Although there have been further trials since the previous guideline, the GDC determined that this low to very low quality evidence was insufficient to change the recommendation.

Further details on the evidence and formulation of the recommendation can be found in *Annex E: evidence profiles, chapter 9: adrenaline/ epinephrine*.

**HYPERTONIC SALINE (Q10) - *In infants presenting to hospital or hospitalised with bronchiolitis, does administration of nebulised hypertonic saline improve clinically relevant endpoints?***

**(R10) - Do not routinely use nebulised hypertonic saline in infants presenting to hospital or hospitalised with bronchiolitis outside of a RCT.**

*Quality of the evidence:* low
*Strength of recommendation:* weak

The recommendation for hypertonic saline was informed by evidence identified in the 2016 guideline and the 2025 update. In the 2016 guideline, there was low to very low quality evidence from one Cochrane systematic review (20 RCTs) (162), three systematic reviews (163-165), and a live meta-analysis (166). Subsequently, the 2025 update included low to very low quality evidence from an updated Cochrane systematic review (34 RCTs) and a retrospective observational study in an ICU setting (167, 168). The new evidence compared administration of ≥3% hypertonic saline to normal saline (0.9%) or standard care in infants hospitalised with bronchiolitis (N=5,309). The Cochrane systematic review additionally included trials where hypertonic saline and normal saline were co-administered with bronchodilators or adrenaline/ epinephrine (167). The 2025 evidence quality was downgraded due to concerns about risk of bias, inconsistency, and imprecision, and publication bias was suspected.

The findings of the 2025 evidence were consistent with the 2016 guideline. Altogether, the evidence indicated that hypertonic saline did not consistently provide clinical benefit in infants hospitalised with bronchiolitis. In a recent meta-analysis (167), nebulised hypertonic saline was initially found to be associated with lower hospitalisation rates and shorter hospital stays in infants with bronchiolitis, compared to nebulised normal saline. However, in subsequent subgroup and sensitivity analyses, the results lost statistical significance. The difference in hospitalisation rates were non-significant for trials that administered hypertonic saline alone versus normal saline alone. The difference in length of stay became non-significant when excluding trials with an unusually long length of stay and older trials. In regards to other clinical outcomes, readmission rates and time

on positive pressure ventilation support were not found to differ between infants who received hypertonic saline versus normal saline or standard care. However, hypertonic saline was associated with reduced risk of mechanical ventilation and a shorter duration of mechanical ventilation in one small, retrospective observational study in ICU patients (168). Hypertonic saline may be associated with mild, spontaneously resolving adverse events.

The GDC concluded that hypertonic saline could be beneficial and may not be associated with substantial harms. However, the degree of uncertainty associated with the findings caution against the routine use of hypertonic saline in all infants presenting to or admitted to hospital for bronchiolitis. Hypertonic saline is relatively low cost and feasible to administer in Australasian hospital settings. It was noted that a considerable proportion of infants who receive nebulised medication find it distressing.

For further detail on the evidence and recommendation development process for this topic, see *Annex E: evidence profiles, chapter 10: hypertonic saline*.

**GLUCOCORTICOIDS (Q11a) - *In infants presenting to hospital or hospitalised with bronchiolitis, does administration of systemic or local glucocorticoids (nebulisation, oral, IM or IV) improve clinically relevant endpoints?***

**(R11a) - Do not use systemic or local glucocorticoids in infants with bronchiolitis*.**

*Quality of evidence:* low
*Strength of recommendation:* strong

*For guidance on the use of glucocorticoids when SARS-CoV-2 infection is present, refer to R22b '*SARS-CoV-2 treatment*.'

**(Q11b) - *In infants presenting to hospital or hospitalised with bronchiolitis, with a positive response to beta2 agonists, does administration of systemic or local glucocorticoids (nebulisation, oral, IM or IV) improve clinically relevant endpoints?***

**(R11b) - Do not use glucocorticoids for the routine treatment of infants with bronchiolitis with a positive response to beta2 agonists or other markers of a latter asthmatic phenotype outside of a RCT. Beta2 agonists should not be used in infants aged <12 months (see Q8a,b).**

*Quality of evidence:* NA
*Strength of recommendation:* strong

**(Q11c) - *In infants presenting to hospital or hospitalised with bronchiolitis, does administration of the combination of systemic or local glucocorticoids (nebulisation, oral, IM or IV) and adrenaline improve clinically relevant endpoints?***

**(R11c) - i) Do not routinely use a combination of systemic or local corticosteroids and adrenaline/epinephrine in infants presenting to or hospitalised with moderate bronchiolitis outside of the ICU setting.**

**ii) Consider using a combination of systemic or local corticosteroids and adrenaline/epinephrine in infants with severe bronchiolitis requiring ICU level care.**

*Quality of evidence:* moderate
*Strength of recommendation*: i) conditional
ii) conditional

R11a. This recommendation was based on evidence included in the 2016 guideline and the 2025 update. The 2016 guideline included high to low quality evidence from one Cochrane systematic review covering 17 RCTs (169), and two subsequent RCTs (170, 171). The 2025 update included evidence from two systematic reviews of systematic reviews

(172, 173), one systematic review with network meta-analysis (150), one systematic review (174), two RCTs (175, 176), and one observational cohort study in an ICU setting (177). The evidence was downgraded due to concerns about risk of bias, inconsistency, indirectness, and imprecision.

Overall, glucocorticoids were not found to differ from placebo in terms of effects on hospitalisation rates, length of stay, mechanical ventilation rates, hospital readmission rates, and time on positive pressure ventilation support. However, glucocorticoids were associated with mild adverse events.

Although the overall evidence was of low quality, the GDC determined that there was a reasonable amount of evidence to suggest no clinical benefit of glucocorticoids in infants aged <12 months with bronchiolitis. Glucocorticoids may result in mild adverse events, and the long-term effects are unknown. Given the lack of evidence to support the use of glucocorticoids in infants with bronchiolitis, the GDC determined that they should not be routinely used in this population.

R11b. Neither the 2016 guideline nor the 2025 update identified any evidence evaluating the effect of glucocorticoids in infants with a positive response to beta2 agonists or other markers of a latter asthmatic phenotype. As a result, the recommendation was based on consensus opinion of the GDC. The GDC acknowledged although there was a lack of evidence in this subgroup, the benefits of glucocorticoids do not appear to outweigh the potential harms in infants with bronchiolitis. Glucocorticoids have been associated with mild self-limiting, short-term adverse events. The long-term adverse effects of short courses of glucocorticoids are unknown. The uncertain benefits of glucocorticoids in infants with bronchiolitis may negatively affect acceptability. The GDC judged that glucocorticoids should not be used outside of RCTs for non-critically ill (non-ICU) infants with bronchiolitis presenting to or admitted to hospital.

R11c. The recommendation for combination glucocorticoid and adrenaline/epinephrine therapy was based on evidence included in the 2016 guideline and the 2025 update. The 2016 guideline included low to very low quality evidence from one multicentre RCT (178), plus indirect evidence reporting on the effects of glucocorticoids and adrenaline separately in infants with bronchiolitis from two Cochrane systematic reviews (156, 169), three systematic reviews (30, 141, 179) and seven subsequent RCTs (157-161, 180, 181). The 2025 update included moderate to low quality evidence from one systematic review with network meta-analysis (150), one systematic review with meta-analysis (182), and one RCT (176). The evidence was downgraded from concerns about imprecision and indirectness.

Combined glucocorticoid and adrenaline/epinephrine therapy was found to have conflicting results in terms of effects on hospital length of stay. More recent evidence has suggested that dexamethasone plus adrenaline/epinephrine may be associated with a shorter length of hospital stay, particularly in premature infants. However, this finding in premature infants came from one study and some evidence suggests there is no effect on length of stay. There have also been conflicting results for effects on hospital admissions, although on balance the current evidence suggests that combined therapy may not improve hospitalisation rates for infants with bronchiolitis. However, combined therapy was associated with a shorter time on positive pressure ventilation support

compared to standard care in infants with bronchiolitis receiving ICU level care. There was no evidence evaluating the effects of combined therapy on readmission rates in either guideline. There may be some mild adverse events associated with combined glucocorticoid and adrenaline/epinephrine therapy.

The GDC judged that based on the evidence to date, the benefits of combination therapy do not appear to outweigh the possible harms for infants with bronchiolitis, which were identified to be mild adverse events. Given the lack of supportive evidence, combined therapy should not be routinely used in the treatment of infants with bronchiolitis outside of the ICU setting.

For further information on the evidence and recommendation development process, refer to *Annex E: evidence profiles, chapter 11: glucocorticoids*.

**SUPPLEMENTAL OXYGEN AND SATURATION TARGETS (Q12a) - *In infants presenting to hospital or hospitalised with bronchiolitis, does administration of supplemental oxygen improve clinically relevant endpoints?***

**(R12a) - Consider the use of supplemental oxygen in the treatment of hypoxaemic* infants with bronchiolitis.**

***For definitions of hypoxaemic and target oxygen saturation levels, see Q12b ('Oxygen saturation targets').**

*Quality of the evidence:* low
*Strength of recommendation:* conditional

**(Q12b) - *In infants presenting to hospital or hospitalised with bronchiolitis, what level of oxygen saturation should lead to commencement or discontinuation of supplemental oxygen to improve clinically relevant endpoints?***

**(R12b) - Consider the use of supplemental oxygen in infants with bronchiolitis if their oxygen saturation is:**

- **Persistently <90%, for infants aged ≥6 weeks;**
- **Persistently <92%, for infants aged <6 weeks, or infants aged <12 months with an underlying health condition.**

*Quality of the evidence:* low
*Strength of recommendation:* weak

R12a. This recommendation was based on evidence reported in the 2016 guideline, as no new eligible evidence was identified for this topic in the 2025 update. The 2016 guideline included low to very low quality evidence from one systematic review (183), one systematic review and guideline (179), one prospective (184) and one retrospective observational study (185).

The benefit of supplemental oxygen therapy has not been directly evaluated in trials in hypoxaemic infants with bronchiolitis, likely due to the ethical issues associated with withholding supplemental oxygen. There is an assumption about the benefits of supplemental oxygen in this group based on first principles. Observational studies have found that administration of supplemental oxygen may be associated with a greater likelihood of hospital admission and a longer length of stay (179, 184, 185). However, these associations may be due to confounding variables, as opposed to the direct effects of the therapy (e.g., the chosen $SpO_2$ target (184), the use of continuous pulse oximetry creating perceptions of a need for supplemental oxygen (185), and the use of low $SpO_2$ as a presumed likely surrogate marker of illness severity). No evidence was found that reported on hospital readmission rates and feeding difficulties in infants with bronchiolitis who received supplemental oxygen therapy.

The GDC recommended the use of supplemental oxygen in hypoxaemic infants with bronchiolitis

based on first principles. This recommendation was conditional as there was weak evidence, with recognition that the setting where the infant is being assessed may affect practice around the initiation of supplemental oxygen. Oxygen therapy is low cost and readily available across Australasian hospitals.

Further details on the evidence and the recommendation development process are reported in *Annex E: evidence profiles, chapter 12a: oxygen*.

R12b. This recommendation was based on moderate to low quality evidence included in the 2016 guideline, as no eligible evidence was identified during the 2025 update. The 2016 guideline included two systematic reviews (183, 186), an evidence-based guideline (179), two RCTs (187, 188), a prospective observational study (184), and three retrospective observational studies (185, 189, 190).

The evidence from the 2016 guideline found that lower oxygen saturation levels may be associated with a greater likelihood of hospital admission and a longer length of stay. Oxygen saturation levels did not appear to be associated with subsequent hospital readmissions. The use of $SpO_2$ targets of <92% did not appear to impact on feeding difficulties.

Although no additional evidence was identified in the 2025 update, one RCT included in the 2016 guideline was revisited by the GDC. This trial prompted a 2021 update to the NICE bronchiolitis guideline recommendation on oxygen saturation targets (191). The trial found that an $SpO_2$ target of 90% prior to discharge had no adverse effects in otherwise healthy infants with bronchiolitis aged 6 weeks to 12 months. It was concluded that a $SpO_2$ target of 90% was as safe and clinically effective as one of 94% in this population. However, the trial excluded infants <6 weeks of age or with underlying health conditions, and therefore it is unclear if the results are generalisable to these sub-groups.

The GDC determined that the recommendation should be updated based on the RCT's findings. As the trial did not include infants <6 weeks age or infants with underlying health conditions, the recommended saturation target for initiating supplemental oxygen in these groups will remain at <92%. The GDC acknowledged that in general, clinical practice in Australasia is moving towards providing oxygen supplementation only when saturations are <90%. The threshold of 92% oxygen saturation in infants <6 weeks old or with underlying health conditions will ensure the most vulnerable of children are accounted for.

The GDC indicated that interpretation of the terms "persistently less" in the recommendation should be considered in view of the stage at which the child is in the disease course (early vs. late), and whether the child is awake or asleep. Oxygen saturations should not be considered alone for decision-making regarding admission and are one of many datapoints to be considered in view of the full disease picture involving other factors, including the day of illness, need for supplemental feeding, and underlying risk factors. The GDC additionally acknowledged that there is limited evidence on the effects of oxygen saturation targets on long-term neuro-cognitive outcomes.

When used, supplementary oxygen should be discontinued when oxygen saturations are persistently greater than or equal to the appropriate threshold outlined (90% or 92%) (see Figure 2 for guidance on observation periods). Oxygen saturations should be tested and monitored every 4 to 6 hours, according to institutional policy.

Further information on the evidence and recommendation development process is available in *Annex E: evidence profiles, chapter 12b: saturation targets*.

**CONTINUOUS PULSE OXIMETRY (Q13) - *In infants hospitalised with bronchiolitis does continuous monitoring of pulse oximetry beneficially change medical management or clinically relevant endpoints?***

**(R13) - Do not routinely use continuous pulse oximetry for medical management of non-hypoxaemic infants ($SpO_2$ ≥90% for infants ≥6 weeks age; or $SpO_2$ ≥92% for infants <6 weeks age, or infants aged <12 months with an underlying health condition), with bronchiolitis not receiving oxygen, or stable infants receiving low-flow oxygen, who are not at risk of apnoea.**

*Quality of the evidence:* moderate
*Strength of recommendation:* conditional

This recommendation was based on evidence included in both the 2016 guideline and the 2025 update. The 2016 guideline included moderate to very low quality evidence from one systematic review (186), one evidence review (183), one systematic review and guideline (179), two RCTs (188, 192), two prospective observational studies (184, 193), and three retrospective observational studies (185, 189, 190). The 2025 update included moderate to low quality evidence from one additional RCT (194). The evidence was downgraded due to concerns about inconsistency and imprecision.

Overall, the evidence tended to indicate that there may be no difference in the hospital length of stay of non-hypoxaemic infants with bronchiolitis and stable clinical status who received continuous or intermittent pulse oximetry (2 RCTs) (192, 194). Continuous pulse oximetry was not shown to reduce length of hospital stay in non-hypoxemic ($SpO_2$ ≥ 92%) infants with bronchiolitis (186, 189). However, it was associated with a longer length of stay by an average of 0.4 days in one retrospective study (190). This finding was not replicated in an RCT, where there was no difference in the length of stay between infants with true and inflated $SpO_2$ ratings shown via a continuous pulse oximetry device (188). This suggests that the clinicians in this study were valuing other factors over the pulse oximetry rating in their decision making on suitability to discharge.

The other outcomes assessed for this topic were thresholds for oxygen saturations at discharge, frequency of nocturnal desaturations, and maintenance of feeding. There was inconclusive, limited evidence investigating an appropriate oxygen saturation level for discharge in infants with bronchiolitis. One observational study found that a $SpO_2$ of ≥90% at discharge could reduce length of stay by 22 hours (184). Although, an evidence review reported that available guidelines did not show any consensus opinion on oxygen saturation level targets for discharge (183). In terms of nocturnal desaturations, infants with bronchiolitis have been shown to exhibit a pattern of reduced basal $SpO_2$ and abrupt intermittent decreases in $SpO_2$ during the night (193). Use of continuous pulse oximetry does not appear to affect feeding during the course of bronchiolitis (184, 185).

The GDC concluded that continuous pulse oximetry should not be routinely used in the management of non-hypoxaemic infants with bronchiolitis who are not receiving supplementary oxygen, or in stable infants receiving low-flow oxygen. The definition of hypoxaemia was updated in accordance with a change to recommendation 12b. The GDC acknowledged that use of continuous pulse oximetry may increase the likelihood of detecting transient oxygen desaturations of

uncertain significance, which in turn drives extended supplemental oxygen use. Greater caution should be taken when managing infants with a history of apnoea, and continuous pulse oximetry should be used.

The GDC agreed that intermittent monitoring of oxygen saturation should be used for stable non-hypoxaemic infants until discharge. The frequency of monitoring should be dependent on a number of clinical factors, including initial oxygen saturation, vital signs (heart rate, respiratory rate, early warning scores), location (ED or inpatient ward), age, and the presence of risk factors for severe illness. The GDC acknowledged the evidence that intermittent monitoring may be more acceptable in nursing staff, and that there may be no difference in parental anxiety associated with intermittent versus continuous monitoring. Nursing experts within the GDC added that parents may experience anxiety when continuous monitoring is switched off, and emphasized the importance of providing reassurance.

Further information on the evidence and recommendation development process is presented in *Annex E: evidence profiles, chapter 13: continuous pulse oximetry*.

**HIGH-FLOW THERAPY (Q14) - *In infants hospitalised with bronchiolitis does the use of HF nasal cannula improve clinically relevant endpoints?***

**(R14) - i) Do not routinely use HF therapy in infants with mild or moderate bronchiolitis who are not hypoxaemic.***

**ii) Do not routinely use HF therapy as a first-line therapy in infants with moderate bronchiolitis who are hypoxaemic.***

**iii) Consider HF therapy in infants with bronchiolitis who are hypoxaemic,* and who have failed low flow oxygen.**

**iv) Consider HF therapy in infants with bronchiolitis with severe disease prior to continuous positive airway pressure (CPAP).**

***For otherwise healthy infants aged ≥6 weeks: $SpO_2$ persistently <90%. For infants aged <6 weeks, or infants <12 months with an underlying health condition: $SpO_2$ persistently <92%.**

*Quality of the evidence:* Low
*Strength of the recommendation:*
i) Conditional
ii) Conditional
iii) Conditional
iv) Conditional

This recommendation was based on evidence included in the 2016 guideline and the 2025 update. The 2016 guideline included low to very low quality evidence from one 2014 Cochrane systematic review (195) (including one pilot RCT (196)), one systematic review and guideline (179), four literature reviews (197-200), one RCT (201), one prospective interventional study (202), two prospective studies (203, 204), and one retrospective cohort review (205). Subsequently, the 2025 guideline update included moderate to very low quality evidence from six multicentre RCTs (206-211), four single-centre RCTs (212-215), two pilot RCTs (216, 217), and one economic evaluation performed as a sub-study of a multicentre RCT in Australasia (218). The evidence was downgraded due to concerns about risk of bias, imprecision, and inconsistency for certain outcomes.

Altogether, there were nine trials comparing HF therapy to low flow oxygen (LFO) (196, 206-209, 213-215, 218), and five trials comparing HF therapy to CPAP (210-212, 216, 217). The trials were conducted across ICU (n=4) or high-level care (n=1), paediatric ward (n=5), paediatric ward and ED (n=3), and unreported settings (n=1). A series of random-

effects meta-analyses were performed to compare the effects of HF therapy to LFO or CPAP on clinical outcomes in infants with bronchiolitis and an oxygen requirement. There was no significant difference between HF therapy and LFO or CPAP in terms of effects on length of stay, rates of ICU admission, or mechanical ventilation. HF therapy appears to be safe and associated with minimal serious adverse events, including air leak syndrome. HF therapy and LFO were associated with a similar degree of comfort, whereas HF therapy was associated with lower pain and discomfort compared to CPAP. Evidence was lacking for the outcome of time on positive pressure ventilation support. HF therapy may be less cost-effective as a first-line therapy compared to LFO with rescue therapy, according to moderate to low quality evidence from Australia and Aotearoa New Zealand (208, 218). There was no evidence comparing the cost-effectiveness of HF therapy and CPAP in this population or setting.

The GDC determined that HF therapy should be considered as a rescue therapy following failure of LFO in infants with bronchiolitis and an oxygen requirement. LFO failure was defined as persistent tachycardia, tachypnoea, and early warning score not settling despite adequate time on LFO therapy (4-5 hours), or hypoxemia not resolving. This recommendation was based on Australasian evidence that HF therapy may be less cost-effective as a first-line therapy compared to LFO with rescue therapy allowed, and low to very low quality evidence of no significant difference in critical clinical outcomes between infants with moderate bronchiolitis and an oxygen requirement who received HF therapy or LFO.

The GDC also acknowledged the evidence indicating no significant difference in critical clinical outcomes for infants with severe bronchiolitis (receiving ICU level care) and an oxygen requirement, who received HF therapy or CPAP. However, there was evidence of HF therapy being associated with greater comfort scores and lower pain scores than CPAP. This evidence was judged to be supportive of HF therapy being used prior to CPAP in infants with severe bronchiolitis and an oxygen requirement.

The strength of the recommendation was impaired by the low evidence quality. The GDC acknowledged that HF therapy is routinely available and acceptable in Australasian hospital settings. The GDC considered the evidence of over-use in Australia and Aotearoa New Zealand, which has been associated with prolonged hospitalisation (219). There was no evidence to support the use of HF therapy in non-hypoxaemic infants.

Further details on the evidence and recommendation development process are described in *Annex E: evidence profiles, chapter 14: high flow therapy*.

**CHEST PHYSIOTHERAPY (Q15) - *In infants hospitalised with bronchiolitis, does chest physiotherapy improve clinically relevant endpoints?***

**(R15) - Do not routinely use chest physiotherapy in infants with bronchiolitis.**

*Quality of the evidence:* low
*Strength of recommendation:* conditional

This recommendation was informed by evidence included in the 2016 guideline and the 2025 update. In the 2016 guideline, there was high to very low quality evidence from one Cochrane systematic review (9 clinical trials) (220), one RCT (221), two prospective clinical trials (222, 223), three observational studies (224-226), and a systematic review and guideline (30). Subsequently, the 2025

update included low to very low quality evidence from a Cochrane systematic review (17 RCTs) and an additional RCT. Together, the evidence covered a variety of chest physiotherapy techniques including slow passive expiratory techniques, forced passive expiratory techniques, and positioning plus percussion.

Overall, the findings were consistent between the evidence from the 2016 guideline and the 2025 update. Chest physiotherapy was not found to reduce length of hospital stay or length of oxygen therapy, or to improve oxygen saturation levels relative to standard care in infants with bronchiolitis. There was no evidence evaluating the effects of chest physiotherapy on mechanical ventilation rates or on the duration of positive pressure ventilation support in infants with bronchiolitis. Chest physiotherapy may be associated with minor or no adverse events in this population. Most studies found that there may be no difference in the adverse events experienced from chest physiotherapy and standard care. However, one study reported that forced passive expiratory techniques may increase the risk of transient respiratory destabilisation and vomiting.

The GDC concluded that there was low quality evidence indicating no clear clinical benefit of chest physiotherapy in infants with bronchiolitis. The GDC acknowledged that there may be issues with accessing chest physiotherapy in smaller regional and rural hospitals, as trained paediatric respiratory physiotherapists are required.

For further information on the supporting evidence and the recommendation development process, refer to *Annex E: evidence profiles, chapter 15: physiotherapy*.

**SUCTIONING (R16a) - *In infants hospitalised with bronchiolitis, does suctioning of the nose or nasopharynx improve clinically relevant endpoints?***

(**R16a) - i) Do not routinely use nasal suction in the management of infants with bronchiolitis.**

**ii) Consider using superficial suctioning in infants who have respiratory distress or feeding difficulties due to upper airway secretions.**

*Quality of the evidence:* low
*Strength of recommendation:* i) conditional
ii) conditional

**(R16b) - *In infants hospitalised with bronchiolitis, does deep suctioning in comparison to superficial suctioning beneficially improve clinically relevant endpoints?***

**(R16b) - Do not routinely use deep nasal suctioning for the management of infants with bronchiolitis.**

*Quality of the evidence:* low
*Strength of recommendation:* weak

The recommendations were informed by evidence included in the 2016 guideline and the 2025 update. For R16a, the 2016 guideline included low to very low quality evidence from one retrospective study (226) and three narrative reviews or guidelines. This retrospective study was the only evidence included for R16b in the 2016 guideline (226). Subsequently, the 2025 guideline included low to very low quality evidence from two RCTs (227, 228), one crossover RCT (229), and one observational study for R16a (230), and one crossover RCT for R16b (229). The evidence was downgraded due to concerns about risk of bias, indirectness, and imprecision.

Altogether, there was very limited evidence investigating the effects of nasal suctioning on hospital length of stay and time on positive pressure ventilation support in infants with bronchiolitis. However, it appears that deep nasal suctioning may be associated with a longer length of stay compared to superficial suctioning. Deep (nasopharyngeal) suctioning may be associated with more adverse events than superficial suctioning, including nasal bleeding, blood-tinged mucus, and vomiting.

For R16a, the GDC concluded that the benefits of routine nasal suctioning probably do not outweigh the associated harms in infants with bronchiolitis. However, there was very low quality observational evidence to inform the recommendation. The GDC acknowledged that there is likely under-reporting of adverse events, and pain is often overlooked in the literature. The GDC agreed that one off suctioning may be performed prior to oxygen supplementation to avoid clogged nasal prongs and increase comfort. Nasal suctioning is easily implemented in Australasian hospitals, there are very minor resource requirements associated.

For R16b, the GDC determined that deep nasal suctioning should not be routinely used in the management of infants with bronchiolitis. The GDC judged that the benefits of deep nasal suctioning probably do not outweigh the harms, as it may be associated with a longer length of hospital stay and mild adverse events, such as blood-tinged mucus. However, the recommendation was based on very low quality, observational evidence.

For further details on the evidence and recommendation development process, refer to *Annex E: evidence profiles, chapter 16: suctioning*.

**NASAL SALINE (Q17) - *In infants hospitalised with bronchiolitis, does the use of nasal saline drops improve clinically relevant endpoints?***

**(R17) - i) Do not routinely use nasal saline drops in the management of infants with bronchiolitis.**

**ii) Consider a trial of intermittent nasal saline drops at time of feeding in infants with reduced feeding.**

*Quality of the evidence:* very low
*Strength of recommendation:* i) conditional
ii) conditional

Recommendation 17 was informed by evidence included in the 2016 guideline and the 2025 update. The 2016 guideline included very low quality evidence from two RCTs (221, 231). One review (232) and one guideline (233) were also included that recommended nasal saline as a practice point. Subsequently, the 2025 guideline included moderate to low quality evidence from one multicentre RCT (234). This study involved a single application of saline with very short-term outcomes. The evidence was downgraded due to concerns about risk of bias and imprecision. Several of the outcomes varied between the 2016 guideline and the 2025 update.

Altogether, no evidence was found that investigated the effects of nasal saline on length of stay in infants with bronchiolitis. When compared to standard care, nasal irrigation with 0.9% saline solution was associated with a greater improvement in oxygen saturation levels within one hour (234). There was no significant difference in the oxygen saturation levels of infants following nasal irrigation with 0.9% saline solution compared to nasal irrigation with hypertonic saline, apart from at 15-minutes post-treatment where infants exposed to

0.9% solution were found to have a significantly greater oxygen saturation (234). However, this difference may not be clinically relevant. Nasal saline was not found to be associated with any adverse events.

The GDC agreed that nasal saline drops should not be routinely used in the management of infants with bronchiolitis. Although nasal saline use may have small effects on increasing oxygen saturation within one hour of administration and there is no evidence of associated harms, the current evidence is weak and additional research is needed. Nasal saline is available at low cost. The acceptability of nasal saline is less known, although likely to be acceptable to both clinicians and families.

For further information on the supporting evidence and the recommendation development process, refer to *Annex E: evidence profiles, chapter 17: nasal saline*.

**CONTINUOUS POSITIVE AIRWAY PRESSURE (CPAP) (Q18) - *In infants hospitalised with bronchiolitis, does the use of CPAP improve clinically relevant endpoints?***

**(R18) - Consider using CPAP therapy in infants with impending or severe respiratory failure, and/or with severe illness.**

*Quality of the evidence:* very low
*Strength of recommendation:* conditional

This recommendation was informed by evidence included in the 2016 guideline and the 2025 update. The 2016 guideline included very low quality evidence from one Cochrane systematic review (two RCTs in 50 patients) (235), two additional systematic reviews (200, 236), one prospective observational study (237), and one retrospective observational study (238). Subsequently, the 2025 update included very low quality evidence from a revised Cochrane systematic review (3 RCTs), and three prospective and three retrospective observational studies in infants with bronchiolitis who required respiratory support in the ICU (237, 239-242), or who received CPAP in a paediatric ward (243). One of the observational studies was brought forward from the 2016 guideline to extract ICU data that was beyond the scope of the initial guideline. The evidence comparing CPAP to HF therapy was presented in the HF evidence profile (R14). The evidence was downgraded due to concerns about risk of bias and imprecision of effect estimates.

Altogether, there was no clear evidence to indicate that use of CPAP reduced length of stay, or the risk of ICU admission, need for mechanical ventilation, or the duration of respiratory support in infants with bronchiolitis compared to other respiratory support. There were inconsistent findings for the effects of receiving CPAP on ICU admission rates. The proportion of infants requiring mechanical ventilation following CPAP ranged from 1.8% to 15.4% between studies, which may be due to differences in population (e.g., ICU vs. non-ICU), and other study charactertistics. CPAP may be associated with mild adverse events such as irritability, and skin rashes or sores in some infants. There was outdated, indirect evidence for cost-effectiveness, indicating that CPAP may be associated with a lower cost burden than mechanical ventilation in ICU patients with bronchiolitis.

The GDC concluded that there was insufficient evidence to support the routine use of CPAP outside of an ICU setting. It was unclear whether the benefits of CPAP outweighed the potential harms, especially outside of the ICU setting, due to the limited, very low quality evidence. However, there were no serious adverse events associated with CPAP in the Cochrane systematic review. CPAP is readily available in Australasian hospitals, especially

those with an ICU, and it is an acceptable therapy to clinicians. However, access to CPAP may be restricted in regional or rural hospitals without an ICU.

For details of the evidence and recommendation development process, refer to *Annex E: evidence profiles, chapter 18: CPAP*.

**ANTIBIOTIC MEDICATION (Q19a) - *In infants presenting to hospital or hospitalised with bronchiolitis, does the use of antibiotic medication improve clinically relevant endpoints?***

**(R19a) - Do not routinely use antibiotics for the treatment of infants with bronchiolitis.**

*Quality of the evidence:* very low
*Strength of recommendation:* conditional

**(Q19b) - *In infants presenting to hospital or hospitalised with bronchiolitis, does the use azithromycin medication improve clinically relevant endpoints?***

**(R19b) Do not routinely use azithromycin for treatment of bronchiolitis in infants admitted to hospital.**

*Quality of the evidence:* low
*Strength of recommendation:* weak

**(Q19c) - *In infants presenting to hospital or hospitalised with bronchiolitis, does the use of antibiotic medication in infants who are at risk of developing bronchiectasis, improve clinically relevant endpoints?***

**(R19c) Do not routinely use antibiotics for the treatment of bronchiolitis in infants who are at risk of developing bronchiectasis (due to known risk factors such as virus type (e.g., Adenovirus, Indigenous ethnicity, socioeconomic disadvantage).**

*Quality of the evidence:* very low
*Strength of recommendation:* weak

These recommendations were based on evidence included in the 2016 guideline and the 2025 update.

R19a. The 2016 guideline included moderate to low quality evidence from two Cochrane systematic reviews (244, 245), and two RCTs (246, 247). Subsequently, the 2025 update included very low quality evidence from a revised Cochrane systematic review with meta-analysis of two RCTs (248), a network meta-analysis of RCTs (150), and three observational studies (249-251). The evidence was downgraded due to concerns about risk of bias and imprecision. For some outcomes, there were additional concerns about inconsistency and indirectness.

The findings of the 2025 update were mostly consistent with the 2016 guideline. There was no significant difference in hospital length of stay, readmission within six months, or persistent respiratory symptoms in infants with bronchiolitis who received antibiotics (macrolides or penicillin-like) versus placebo or standard care. There was very limited evidence indicating that antibiotics may reduce risk of ICU admission but increase risk of intubation if received on the first day of an ICU stay. However, this evidence was very low quality. There was no evidence evaluating the effect of antibiotics on time on positive pressure ventilation support in infants with bronchiolitis. There was low quality evidence from two RCTs, which found no significant difference in gastrointestinal adverse events between infants who received antibiotics or placebo.

The GDC concluded that antibiotics should not be routinely used for the treatment of bronchiolitis in infants. The GDC acknowledged that there have been more trials on antibiotics since the 2016 guideline.

However, these studies provide low to very low quality evidence and are insufficient to change the previous recommendation. The GDC agreed that the evidence in the intensive care environment to date has not shown that antibiotics are beneficial, however this evidence was very low quality. Overall, the GDC determined that the benefits of antibiotic therapy probably do not outweigh the harms, given there is limited evidence of benefit and the possibility of harms from antibiotic overprescribing, including antibiotic resistance.

R19b. This recommendation was informed by evidence included in the 2016 guideline and the 2025 update. The 2016 guideline included moderate to low quality evidence from one Cochrane systematic review of three RCTs (244), and two subsequent RCTs (246, 247). The 2025 update included moderate to very low quality evidence from two additional RCTs (252, 253), and ICU outcome data were extracted from one of the 2016 articles (246).

Altogether, azithromycin did not significantly differ from placebo in terms of effects on rates of ICU admission, mechanical ventilation, hospital readmission within six months, or persistent respiratory symptoms in infants with bronchiolitis. However, there was very low quality evidence from one RCT that found that azithromycin may reduce the risk of recurrent wheezing at three months. A meta-analysis of seven RCTs indicated that azithromycin may be associated with a significantly shorter length of hospital stay compared to placebo in infants with bronchiolitis. However, this finding should be interpreted with caution due to the low evidence quality. Moreover, statistical significance was lost in sensitivity analyses when removing trials from the meta-analysis with lower generalisability to an Australasian hospital context, due to abnormally long average lengths of stay for these trials (≥5 days). There was no evidence looking at the effect of azithromycin on time on positive pressure ventilation support in infants with bronchiolitis. The adverse events associated with azithromycin did not differ from placebo in three small meta-analyses.

The GDC determined that azithromycin should not be routinely used for the treatment of bronchiolitis in infants. Although there have been more trials since the previous guideline, these studies have raised more questions about the effects of the medicine, especially regarding its impact on length of stay. The GDC judged that these findings are important but inconclusive and insufficient to change the recommendation. Although adverse events did not significantly differ between azithromycin and placebo, the evidence was low to very low quality, and there remains a concern about the risk of antibiotic resistance. The GDC noted that not all trials followed standard treatment dosing for azithromycin, and there is a risk of publication bias.

R19c. This recommendation was based on evidence included in the 2016 guideline, as the 2025 update did not include any new evidence on the use of antibiotics in infants with bronchiolitis and risk factors for bronchiectasis. The 2016 guideline included moderate quality evidence from one RCT of azithromycin in 219 Indigenous infants in Australia and Aotearoa New Zealand (247). This trial found no significant difference in persistent respiratory symptoms or rates of hospital readmission within six months between infants who received azithromycin or placebo. There was no evidence evaluating the effect of antibiotic treatment on the development of bronchiectasis or adverse events in this subgroup.

The GDC concluded that antibiotics should not be routinely used for the treatment of bronchiolitis in infants with risk factors for

bronchiectasis. Based on the limited 2016 evidence, the benefits do not appear to outweigh the possible harms (e.g., antibiotic resistance) in this subgroup.

For further information on the evidence and recommendation development process, refer to *Annex E: evidence profiles, chapter 19a,c: antibiotics* and *chapter 19b: azithromycin*.

**NON-ORAL HYDRATION (Q20a) - *In infants presenting to hospital or hospitalised with bronchiolitis, does the use of non-oral hydration improve clinically relevant endpoints?***

**(R20a) - Use supplemental hydration for infants with bronchiolitis who cannot maintain hydration orally.**

*Quality of the evidence:* NA
*Strength of recommendation:* strong

**(Q20b) - *In infants presenting to hospital or hospitalised with bronchiolitis, what forms of non-oral hydration improve clinically relevant endpoints?***

**(R20b) - i) Use either NG or IV routes for non-oral hydration in infants admitted to hospital with bronchiolitis requiring supplemental hydration.**

**ii) Consider NG as the preferred first method of non-oral hydration in infants with moderate bronchiolitis requiring supplemental hydration.**

**iii) Consider either continuous or bolus methods of NG non-oral hydration with oral rehydration solution, breast milk, or formula in infants admitted to hospital with bronchiolitis requiring an NG.**

*Quality of the evidence:* moderate
*Strength of recommendation:* i) strong
ii) weak
iii) conditional

**(Q20c) - *In infants presenting to hospital or hospitalised with bronchiolitis, does limiting the volume of non-oral hydration impact on clinically relevant endpoints?***

**(R20c) - Consider using fluid restriction at 50-75% of recommended maintenance due to the risk of fluid overload from syndrome of inappropriate antidiuretic hormone secretion (SiADH), and hyponatremia in bronchiolitis. Monitor for signs of overhydration.**

*Quality of the evidence:* NA
*Strength of recommendation:* consensus-based recommendation

**(Q20d) - *In infants presenting to hospital or hospitalised with bronchiolitis, does the type of intravenous fluid impact clinically relevant end-points?***

**(R20d) - Consider using either 0.9% sodium chloride (normal saline) with 5% glucose, or balanced fluid (e.g., Plasma-lyte 148™ or Hartmann's solution) with 5% glucose for use as maintenance fluid in infants admitted to hospital with bronchiolitis requiring IV hydration. For younger infants aged up to 4 weeks corrected with bronchiolitis, consider addition of 10% glucose, or monitoring of blood sugar levels if receiving 5% glucose.**

*Quality of the evidence:* NA
*Strength of recommendation:* consensus-based recommendation

**(Q20e) - *In infants presenting to hospital or hospitalised with bronchiolitis and managed with high flow therapy, does the use of enteral nutrition (oral and non-oral) impact clinically relevant endpoints?***

**(R20e) - i) Consider enteral feeding (NG or oral), if tolerated, in infants receiving high flow.**

**ii) Consider continuous NG feeding in infants receiving CPAP who are not judged at imminent risk of intubation.**

*Quality of the evidence:* very low
*Strength of recommendation:*
i) weak
ii) consensus-based recommendation

R20a. This recommendation was based on consensus opinion and indirect evidence reported in the 2016 guideline, as no eligible evidence was found in the 2025 update. The GDC made a strong recommendation for the use of supplemental hydration in infants who cannot maintain hydration orally predominantly based on first principles. Although there was no direct evidence investigating the benefit of non-oral hydration in infants with bronchiolitis, there is consistent support for intervention with severe dehydration. As a result, the GDC were confident that the benefits would outweigh the harms in most or all infants. The exact level of dehydration or reduced feeding warranting intervention has not been established.

R20b. This recommendation was based on evidence included in the 2016 guideline and the 2025 update. In the 2016 guideline, there was moderate to low quality evidence from one RCT (254) and one pilot study (255). Subsequently, the 2025 update included moderate to very low quality evidence from one Cochrane systematic review of one RCT and one pilot RCT (256), two additional RCTs (257, 258), and one retrospective cohort study (259). An additional RCT was brought forward from the 2016 guideline evidence to extract data on mechanical ventilation, which was a new ICU outcome to the 2025 guideline (254). The evidence was downgraded due to concerns about imprecision and risk of bias.

Altogether, the evidence indicated that NG and IV routes of fluid administration were comparable in terms of effects on length of stay, rates of readmission, need for mechanical ventilation, and time on positive pressure ventilation support in infants with bronchiolitis. There was no difference in the incidence of apnoea, bradycardia, or epistaxis between the methods. However, there was a trend towards a lower incidence of local complications in infants who received NG hydration compared to IV hydration. NG hydration was also associated with a greater likelihood of success on first attempt.

There was limited evidence comparing intermittent bolus and continuous NG hydration methods, however infants were not found to differ in length of stay or readmission rates following receipt of either in one RCT (257). There was also only one RCT comparing NG and nasoduodenal (ND) methods in infants with bronchiolitis (258). This study found no difference in the length of stay, readmission rates, need for mechanical ventilation, adverse events, or insertion success associated with the two methods.

The GDC concluded that NG and IV routes of hydration appeared comparable for all critical outcomes, suggesting that either method could be used when non-oral hydration is required for an infant with bronchiolitis. However, NG administration was associated with fewer local adverse events and greater first attempt success, indicating that a NG route should be the preferred first method of non-oral hydration. The GDC also felt there was additional benefit with respect to the nutrition that may be provided with NG hydration. It was acknowledged that there was a lack of evidence comparing NG and IV routes in infants with severe bronchiolitis. However, both NG and IV methods may be acceptable for infants with moderate or severe illness receiving HF therapy (see R20e).

The GDC did not routinely recommend the use of ND hydration, as ND tube placement requires additional skill and resourcing, including Xray, and there was only one small RCT investigating its use in this population.

R20c. There was no direct evidence included for the topic of fluid restriction in the 2016 guideline, nor any evidence identified in the 2025 update. Therefore, the recommendation was based on consensus opinion of the GDC and consideration of the indirect evidence from three related observational studies (100, 260, 261). These studies were undertaken during an era of routine use of hypotonic maintenance fluids and found an association between use of hypotonic fluid and increased risk of hyponatremia.

The GDC acknowledged that infants with bronchiolitis are at greater risk of hyponatremia due to inappropriate anti-diuretic hormone secretion. This suggests that caution is required with maintenance fluid volumes. The GDC reported that limiting maintenance fluid volume is feasible and routinely undertaken in Australasian hospitals.

R20d. Type of IV fluid was a new topic to the guideline included in the 2025 update. As no eligible evidence was identified, the recommendation was developed from consensus opinion of the GDC. The GDC also considered related evidence that was reported in the 2016 guideline from two observational studies (260, 261), and indirect evidence from an Australasian RCT comparing Plasma-lyte 148™ versus 0.45% sodium chloride in 690 children of all ages and diagnosis requiring maintenance IV fluid (262).

The 2016 guideline reported on a prospective cohort study of 36 infants with moderate bronchiolitis who received a standard parenteral hypotonic solution (261). This study showed drop in serum sodium and osmolality compared to admission despite improvement in respiratory parameters. An earlier study of hyponatraemia in 91 infants with severe bronchiolitis requiring ICU admission, with 4% suffering hyponatraemic seizures, showed that three of the four had received hypotonic fluids (260). Further, a single centre Australasian RCT comparing Plasma-lyte 148™ versus 0.45% sodium chloride IV fluid found significantly fewer patients in the Plasma-lyte 148™ arm developing hyponatremia (11% vs. 4%, OR 0.31, 95% CI 0.16 to 0.61, p=0.001) (262). This evidence suggests that there may be harms associated with IV hypotonic fluids in infants with bronchiolitis.

The GDC determined that the use of isotonic fluid is supported by observational studies in bronchiolitis and the RCT comparing isotonic and hypotonic IV fluid for IV maintenance therapy in paediatric patients of all ages and diagnoses, including infants <1 year of age and in patients with respiratory diagnoses. Isotonic IV fluid is readily available in Australasian hospitals, as Plasma-lyte 148™ or 0.9% sodium chloride (normal saline). However, Plasma-lyte 148™ is marginally more expensive than 0.9% sodium chloride, which may have some resource implications.

Although this topic focuses on IV fluid, the GDC noted it is important to highlight the lack of evidence indicating what NG fluids should be used for infants with bronchiolitis. To date, the evidence has involved use of heterogenous fluids within studies. The GDC reported that breast milk or formula would be preferred in the long-term (however administered at reduced amounts to reduce the risk of complications). However, what is appropriate may depend on the illness severity of the child.

R20e. Use of enteral nutrition (oral and non-oral) during HF therapy was a new topic to the guideline in the 2025 update. The recommendation was based on very low quality evidence from seven observational studies (263-269). These studies compared the effect of any enteral hydration versus no enteral hydration (IV only), early versus late initiation of enteral hydration, and enteral hydration with and without interruptions >8 hours duration in infants with bronchiolitis receiving high-flow and/or non-invasive ventilation support. Five of seven studies were conducted solely in an ICU setting. The evidence was downgraded due to concerns about risk of bias, inconsistency, indirectness, imprecision, and study design (observational evidence in a topic where RCT evidence was sought).

Altogether, the evidence suggested that enteral feeding during HF therapy could be beneficial in terms of length of stay, need for mechanical ventilation, and time on positive pressure ventilation support compared to no enteral hydration (IV only) in infants with bronchiolitis. However, there was some inconsistency in the findings between studies. Moreover, these findings were based on limited, very low quality evidence, therefore there was low confidence in the results. There were minimal adverse events associated with enteral feeding during HF therapy compared to no enteral hydration (IV only).

The GDC acknowledged that although the evidence is very low quality, it appears that the benefits associated with enteral feeding during HF therapy could outweigh the harms. This was based on evidence of improvement in clinical outcomes associated with enteral feeding during HF in some studies, and minimal adverse events or serious adverse events observed. However, there was low confidence in the evidence, and there is a risk of confounding by severity (e.g., those infants who have less severe disease in the observational studies are allowed enteral feeding, while those with severe disease are placed on IV fluid only). Additional research is needed in this area.

For further information regarding the evidence and recommendation development process, refer to *Annex E: evidence profiles, chapter 20: non-oral hydration*.

**INFECTION CONTROL PRACTICES (Q21) - *In infants presenting to hospital or hospitalised with bronchiolitis, do infection control practises improve clinically relevant endpoints?***

**(R21) - i) Use hand hygiene practices for the management of infants with bronchiolitis.**

**ii) Consider multicomponent infection control practices for the management of infants with bronchiolitis.**

**iii) Consider cohorting of infants admitted to inpatient wards with bronchiolitis.**

*Quality of the evidence:* very low
*Strength of recommendation:* i) strong
ii) weak
iii) weak

The recommendation was based on evidence included in the 2016 guideline and the 2025 update. The 2016 guideline included low to very low quality evidence from four observational studies (270-273), and one Cochrane systematic review that reported indirect evidence (274). Subsequently, the 2025 update included very low quality evidence from one systematic review (275), and one prospective cohort study (276). The evidence was downgraded due to concerns about risk of bias, inconsistency, indirectness, and imprecision.

Infection control practices have been shown to reduce rates of nosocomial infection in

infants with bronchiolitis (271-274). In particular, multicomponent infection control interventions (e.g., including infant isolation or cohorting, handwashing, gowns, staff cohorting) have been shown to be effective in this population (275). However, there is a lack of RCT evidence on this topic, and it is unclear whether there is a specific infection control practice driving the effects of the multicomponent interventions that should be focused on in clinical practice.

There was limited evidence reporting on the other guideline outcomes for this topic: length of stay, adverse events, and cost-effectiveness. There was no evidence for length of stay effects in either guideline, and the 2025 update did not find any new evidence on cost-effectiveness or adverse events. Evidence from the 2016 guideline regarding the cost-effectiveness of infection control measures was inconclusive (270). There did not appear to be adverse events associated with the infection control practices assessed (273, 274).

Although there was no direct evidence investigating hand hygiene practices, the GDC provided a strong recommendation for this practice as there was high certainty of its benefit. The GDC acknowledged that there was very low quality, but consistent evidence indicating that there may be a benefit of multicomponent infection control interventions for reducing risk of nosocomial infection. The potential benefits of this approach were judged to outweigh the time and costs associated. Cohorting was judged to have minimal resource requirements, although its suitability may depend on the characteristics of the inpatient ward. Otherwise, both practices were judged to be feasible and generally acceptable in Australasian hospital settings.

For further information on the evidence and recommendation development process, refer to *Annex E: evidence profiles, chapter 21: infection control practices*.

**SARS-COV-2 CO-INFECTION AND TREATMENT**

**(Q22a) -** ***In infants presenting to hospital or hospitalised with bronchiolitis, to what extent does SARS-CoV-2 virus infection, or co-infection, contribute to disease incidence or severity?***

**(R22a) - Do not routinely use SARS-CoV-2 status to stratify increased risk for deterioration in infants with bronchiolitis. SARS CoV-2 infection or co-infection does not appear to place infants at increased risk of severe outcome from bronchiolitis.**

*Quality of the evidence:* very low
*Strength of recommendation:* weak

**(Q22b) -** ***In infants presenting to hospital or hospitalised with bronchiolitis, who test positive for SARS-CoV-2, does use of therapies targeting the SAR-CoV-2 virus (steroids, antivirals) improve clinically relevant endpoints?***

**(R22b) - i) Consider use of dexamethasone in hypoxic patients presenting with bronchiolitis who are also positive for SARS-CoV-2 co-infection.**

**ii) Consider use of remdesivir in immunosuppressed infants who are also positive for SARS-CoV-2 infection.**

*Quality of the evidence:* NA
*Strength of recommendation:*
i) consensus-based recommendation
ii) consensus-based recommendation

R22a. SARS-CoV-2 co-infection was a new topic to the guideline. The recommendation was based on evidence identified during the 2025 update. There was very low quality evidence from four prospective and three

retrospective observational studies that together reported on hospital length of stay and ICU admission rates associated with SARS-CoV-2 infection in infants with bronchiolitis (277-283). The evidence was downgraded due to risk of bias, imprecision, and indirectness in some cases.

The evidence to date suggests that SARS-CoV-2 infection may be present in ≤5% of infants with bronchiolitis. Infants with SARS-CoV-2 bronchiolitis have not been found to have a more severe disease course than infants who are SARS-CoV-2 negative.

There was no significant difference in ICU admission rates between infants with bronchiolitis who were SARS-CoV-2 positive versus negative or with rhinovirus infection in four observational studies (278-280, 282). In these studies, none of the infants with SARS-CoV-2 bronchiolitis were admitted to the ICU. ICU admission rates were not found to differ between infants with SARS-CoV-2 and RSV co-infection versus infants with RSV only (281, 283).

The findings for SARS-CoV-2 bronchiolitis and hospital length of stay seemed to vary depending on the comparison. Two multicentre studies found no significant difference in the hospital length of stay of infants with bronchiolitis who were SARS-CoV-2 positive or negative (N=2,318, n=111 infants with SARS-CoV-2 co-infection) (278, 282). Infants with SARS-CoV-2 and RSV bronchiolitis may experience a longer length of stay than infants with RSV bronchiolitis (283), and SARS-CoV-2 bronchiolitis alone (281). SARS-CoV-2 bronchiolitis was associated with a significantly shorter length of stay than rhinovirus bronchiolitis in one study (279). Altogether, there was no clear evidence to indicate that SARS-CoV-2 bronchiolitis was associated with a longer length of hospital stay compared to bronchiolitis with other viral infection. No evidence was found that reported on adverse events associated with SARS-CoV-2 bronchiolitis.

The GDC determined that there was a lack of evidence indicating that infants with SARS-CoV-2 infection were at a greater risk of severe outcome from bronchiolitis. Increased risk stratification and testing for SARS-CoV-2 infection was therefore not recommended in infants with bronchiolitis. It was acknowledged that there was limited, very low quality evidence on which to base the recommendation.

R22b. Recommendation 22b covered a new topic to the guideline for which no direct evidence was available. The recommendation was formed from consensus opinion of the GDC after considering indirect evidence on SARS-CoV-2 therapies in other paediatric or adult populations (284-289), and the recommendations of SARS-CoV-2 clinical practice guidelines from the Royal Children's Hospital (Melbourne, Australia), Starship Children's Hospital (Auckland, Aotearoa New Zealand), the American Academy of Pediatrics, and the National Institutes of Health (286, 290-292). These guidelines formed their recommendations based on extrapolated adult evidence and expert opinion. All guidelines recommended the use of dexamethasone in SARS-CoV-2 positive children requiring oxygen support, and remdesivir in immunocompromised children.

The GDC acknowledged that there is a lack of RCT evidence supporting the use of dexamethasone or remdesivir in infants with bronchiolitis and SARS-CoV-2 infection. However, there is RCT evidence supporting these therapies in adults, and other guidelines have cautiously recommended these treatments for some subgroups of children based on extrapolated adult evidence. Both medications are readily available with good

acceptability in Australia and Aotearoa New Zealand.

Further detail on the evidence and recommendation development process is available in *Annex E: evidence profiles, chapter 22b: SARS-CoV-2 treatment*.

## RSV Prevention

**INFANT RSV MONOCLONAL ANTIBODY PROPHYLAXIS (Q23) - *Which infants at risk of serious outcomes from bronchiolitis, have clinically relevant benefit from monoclonal antibody therapy (e.g. palivizumab)?***

**(R23) - i) Consider use of monoclonal antibodies (palivizumab or nirsevimab) during RSV season in infants at increased risk of severe complications with bronchiolitis; chronic lung disease, congenital heart disease, and infants born very preterm (<32 weeks' gestational age).**

**ii) Consider universal nirsevimab as a population-based approach to reduce morbidity due to RSV bronchiolitis.**

*Quality of evidence:* moderate
*Strength of recommendation:* i) conditional
ii) conditional

Monoclonal antibody prophylaxis for RSV prevention was a new topic to the guideline in the 2025 update. The recommendation was based on high to very low quality evidence from two systematic reviews (293, 294), one meta-analysis of pooled RCT data (295), and subsequent supplementary data from one RCT (296), second season follow-up data from two RCTs (297, 298), a phase 2b RCT (299), a phase 3b RCT (300), and seven recent cost-effectiveness studies in high-income countries (301-307) that altogether reported on short-acting (palivizumab) and long-acting (nirsevimab) monoclonal antibody prophylaxis. The RCT evidence evaluated palivizumab in healthy preterm infants, preterm infants with bronchopulmonary dysplasia, children ≤24 months with congenital heart disease, and in Neonatal ICU (NICU) patients. The RCTs for nirsevimab included healthy term and late preterm infants, and infants with congenital heart disease and/or chronic lung disease of prematurity, and infants who were born extremely preterm (<29 weeks' gestational age (wGA)). The evidence was downgraded due to imprecision, and in the case of the cost-effectiveness data, indirectness, as there were no recent cost-effectiveness evaluations in an Australasian setting.

Overall, both palivizumab and nirsevimab were found to be effective for reducing risk of hospital admissions for bronchiolitis in a variety of at-risk subgroups during their first RSV season. Palivizumab was associated with a significantly lower risk of RSV-related hospitalisation in both healthy infants and in infants with underlying health conditions (congenital heart disease (CHD), prematurity with and without bronchopulmonary dysplasia (BPD), NICU patients) (293). Nirsevimab was found to have a significantly lower risk of RSV-related hospital admission in healthy term and late preterm infants (295). Nirsevimab was also associated with a reduced risk of hospital admission for severe RSV-LRTI that required supplemental oxygen or IV fluids in healthy term and late preterm infants (293, 295, 296, 300). In second season follow-up data, nirsevimab was similar to placebo in terms of the number of infants hospitalised with RSV-LRTI (0.2% vs. 0.3%) (297).

Nirsevimab was found to reduce the risk of ICU admission and the risk of medically attended RSV-LRTI (150 days post dose) in healthy term and late preterm infants, compared to placebo (293, 295). There was no significant difference in the ICU admission

rate of infants with congenital heart disease who received palivizumab versus placebo (293).

Palivizumab and nirsevimab did not appear to differ from placebo in terms of effects on mechanical ventilation rates or adverse events. Palivizumab and nirsevimab were found to have a similar safety profile during the first and second RSV season (following second season booster doses) in preterm infants and in infants with congenital heart disease and/or chronic lung disease (298, 308).

There was no recent evidence directly evaluating the cost-effectiveness of palivizumab or nirsevimab in Australia or Aotearoa New Zealand. A systematic review of 28 economic evaluations of palivizumab, across 11 high-income countries, concluded that there was wide variation regarding palivizumab's economic value within and between subgroups (294). This finding of inconsistency in estimates is in keeping with earlier reviews. For the healthcare system, palivizumab was found to be cost-effective in infants with BPD or CLD, CHD, term infants in some remote communities, and (very) preterm infants with and without lung complications who were aged <6 months at the start of the RSV season. For nirsevimab there was very low quality evidence that a seasonal programme (targeting all infants born during the RSV season), plus catch-up programme (for those born in the non-RSV season), was the most cost-effective programme in five of six European countries modelled (301).

The GDC acknowledged that there was moderate to high quality evidence that both palivizumab and nirsevimab have clear clinical benefit in terms of RSV-related hospital admission, with low to high quality evidence that neither results in significantly increased rates of serious adverse events. Although there is a clear clinical benefit to both, their ultimate use is dependent on cost-effectiveness, for which there was only indirect evidence from other high-income countries. The GDC recommended that policy should focus on targeting the delivery of monoclonal antibodies to Indigenous infants, who have been shown to be at greater risk of RSV complications. Both palivizumab and nirsevimab were expected to be acceptable to clinicians, although nirsevimab may be more feasible to implement with only requiring one intramuscular injection.

The GDC acknowledged the current state- and territory-funded programmes supporting the administration of nirsevimab (Beyfortus™) to at-risk infants and young children in ACT (309), NSW (310), NT (311, 312), QLD (313), TAS (314), WA (315, 316). SA has yet to initiate a state-funded programme, and VIC will fund a programme for the 2025 RSV season (317). Nirsevimab is not currently funded for use in Aotearoa New Zealand.

For further information on the evidence and recommendation development process, refer to *Annex E: evidence profiles, chapter 23: infant RSV monoclonal antibody prophylaxis*.

**MATERNAL ACTIVE RSV IMMUNISATION (Q24) - *Does universal maternal antenatal RSV immunisation result in clinically relevant benefit for infants?***

**(R24) - Consider universal maternal antenatal immunisation with a RSV prefusion F protein-based vaccine as a population-based approach to reduce morbidity due to RSV bronchiolitis.**

*Quality of evidence:* moderate
*Strength of recommendation:* conditional

Maternal RSV immunisation was a new topic to the guideline that was added during the 2025 update. There was moderate to very low

quality evidence from five RCTs and five health economic studies, including one systematic review (318), two pooled RCT analyses from high-income countries (301, 319), and two primary cost-effectiveness studies in high-income countries (305, 306). There was no health economic evidence in an Australasian context. The evidence was downgraded due to concerns about indirectness, imprecision, and inconsistency.

The RCTs evaluated the Pfizer (phase 2b (320), phase 3 (321)), GSK (phase 2 (322)), and Novovax (phase 2 (323), phase 3 (324)) vaccine candidates. These trials provided evidence on the rates of hospital admission with RSV, adverse events, and the rates of medical visits for severe RSV-LRTI following exposure to the vaccine or placebo. The trials reported on adverse events in both maternal and infant subjects. The results were quantitatively synthesized, and subgroup analyses were performed by vaccine candidate where possible.

*In utero* exposure to an RSV prefusion F protein-based vaccine was found to reduce the risk of hospital admission for RSV (Pfizer, Novavax) and medical visits for severe RSV-LRTI in infants (Pfizer).

Exposure to an RSV prefusion F protein-based vaccine was not associated with an increased risk of adverse events in infants, nor serious adverse events in mothers. However, a phase three trial of the GSK vaccine was stopped as a statistically significant difference in preterm births (<37wGA) was observed, with a greater risk of preterm birth associated with vaccine exposure (RR 1.38 (95% CI 1.08 to 1.75)). For the Pfizer vaccine, a numerical increase, but not a statistically significant increase, in numbers of infants born preterm has been demonstrated in phase 3 and 2b trials. This trend is not demonstrated in those vaccinated at 32 to 36 weeks and appears to be mainly in middle-income country settings. There was also evidence of an increased risk of adverse events in mothers following exposure to an RSV prefusion F protein-based vaccine compared to placebo.

The health economic evidence evaluated the cost-effectiveness of maternal RSV immunisation strategies compared to no intervention, and year-round, seasonal, and/or targeted monoclonal antibody prophylaxis programmes. Seasonal use of monoclonal antibodies has been found to be most cost-effective, based on data from seven high-income countries. In some situations (e.g., a willingness-to-pay threshold of CAD$50,000/QALY), a combined year-round RSV prefusion F protein-based maternal vaccine and seasonal, targeted infant nirsevimab programme (for high-risk infants ≤32 wGA and/or with CLD or CHD) may be optimal.

In considering the balance of benefits and harms, the GDC acknowledged that there was moderate quality evidence of efficacy for maternal RSV prefusion F protein-based vaccines, and the side effect profile of the Pfizer Abrysvo vaccine, in particular, appears to be acceptable. While a possible signal of preterm birth has been highlighted, this is not present in high-income countries like Australia and Aotearoa New Zealand, and not present when the vaccine is delivered at 32 to 36 wGA. The GDC acknowledged that only vaccines with regulatory approval should be used in population-based immunisation schedules. Currently only the Pfizer RSV prefusion F protein-based vaccine (Abrysvo) has regulatory approval (FDA and EMA), although it does not have regulatory approval in Australia or Aotearoa New Zealand. The Novavax RSV F protein vaccine candidate has been discontinued. The GDC acknowledged that there would be considerable resource required to implement a new maternal

immunisation to population level programmes in Australia and Aotearoa New Zealand. Compared to seasonal use of monoclonal antibody prophylaxis, universal maternal RSV immunisation appears to be less cost-effective in high-income countries. However, in some situations, combined maternal RSV immunisation and targeted, seasonal infant nirsevimab programmes have been shown to be optimal.

For further information on the evidence and recommendation development process, refer to *Annex E: evidence profiles, chapter 24: maternal active RSV immunisation.*

**INFANT ACTIVE RSV IMMUNISATION (Q25) - *Does universal infant RSV immunisation result in clinically relevant benefit?***

**(R25) - Do not routinely use universal infant RSV immunisation.**

*Quality of evidence:* low
*Strength of recommendation:* weak

Infant RSV immunisation was a new topic to the guideline that was added in the 2025 update. This topic covers the use of active RSV vaccines in infants and excludes monoclonal antibody prophylaxis. There was moderate to very low quality evidence from five RCTs and one systematic review that together evaluated hospitalisation for bronchiolitis, adverse events, medical visits for bronchiolitis, and the cost-effectiveness of active RSV immunisations for infants (318, 325-329). The RCT evidence covered five different vaccine candidates: the D46/ NS2/N/ΔM2-2-HindIII, LID/ΔM2-2/1030s, MEDI-559, RSVcps2 and ChAd155-RSV vaccines. Four of the trials were phase 2 trials in healthy, RSV-seronegative children aged 5 or 6 to 24 months of age (325-328). One of the trials was a phase 1/2 trial in healthy, full-term infants aged 6 to 7 months who were mostly sero-naive (329). Previous attempts at RSV vaccination in the 1960s, using a different candidate vaccine, resulted in increased mortality in infants receiving vaccination. These results hampered further development of a RSV vaccine candidate.

Five small phase 1/2 and two safety trials of five vaccine candidates (D46/ NS2/N/ΔM2-2-HindIII, LID/ΔM2-2/1030s, MEDI-559, RSVcps2, ChAd155-RSV) found that all vaccines were associated with a numerically greater incidence of mild adverse events compared to placebo (325-329). There did not appear to be a difference to placebo in terms of serious adverse events. However, the evidence was imprecise with small sample sizes and there was only one safety trial per vaccine.

There was no evidence of efficacy for any of the vaccine candidates. There was low quality evidence from one phase 1/2 RCT (N=201) that reported on hospital admissions for RSV-LRTI associated with receipt of the ChAd155-RSV vaccine (1 or 2 doses), or a placebo or active comparator in healthy, mostly sero-naive infants aged 6 to 7 months (329). The active comparators could include 4CMenB, MenACWY-TT, PHiD-CV, or MenACWY-CRM and varied by site country. The study found no significant difference in hospitalisation for RSV-LRTI following one or two doses of ChAd155-RSV versus placebo or an active comparator vaccine. The MEDI-559 vaccine was associated with more medical visits for bronchiolitis than placebo within 28 days of inoculation, and from 29 to 365 days of inoculation (326). There was no evidence identified on ICU admissions, mechanical ventilation, or time on positive pressure ventilation support following receipt of any of the vaccine candidates.

An RSV immunisation strategy targeting neonates born before the RSV season was found to be the most cost-effective infant RSV

immunisation strategy in high-income countries according to one systematic review (318). However, there was no direct evidence of cost-effectiveness in Australia or Aotearoa New Zealand.

The GDC recommended against the routine use of infant RSV immunisation due to insufficient evidence of benefit for any of the vaccine candidates. The GDC acknowledged that routine childhood immunisation is an expensive intervention at a population level, therefore clear evidence of efficacy is needed before recommendation. Moreover, no infant RSV vaccine candidates have been approved for use in Australia or Aotearoa New Zealand. However, the GDC were reassured by the promising safety profiles of the vaccine candidates given the historical context.

For further information on the evidence or recommendation development process, refer to *Annex E: evidence profiles, chapter 25: infant active RSV immunisation*.

## Summary of recommendations

The recommendations from the 2025 update of the Australasian Bronchiolitis Guideline are reported below (Table 6). A summary of how the recommendations have changed between the 2016 guideline and the 2025 update is presented in *Annex D: summary of changes in the recommendations between the 2016 guidance and the 2025 update*.

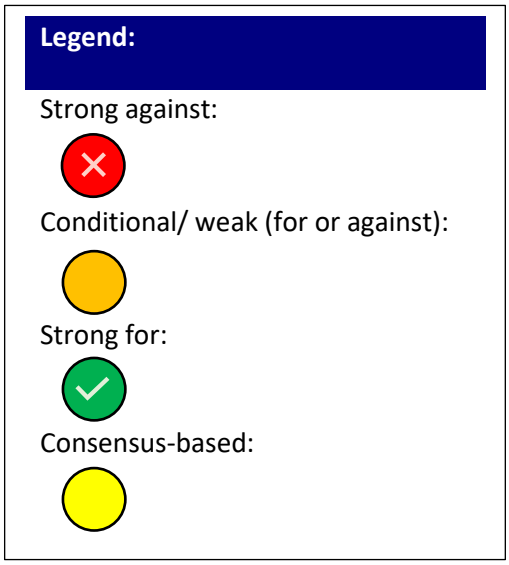


*Table 6. Recommendations from the 2025 Australasian Bronchiolitis Guideline update.*

| Topic | Recommendation | Recommendation strength |
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| **DIAGNOSIS** | | |
| Physical examination and history (Q1) | 1. Consider a diagnosis of bronchiolitis in an infant if they have an upper respiratory tract infection (rhinorrhoea/ nasal congestion, and/or cough), followed by the onset of a lower respiratory tract infection with one or more of respiratory distress (tachypnoea and/or retractions), or presence of diffuse crackles and/or wheeze, with or without the presence of fever. Additional signs and symptoms can include feeding difficulties, vomiting, dehydration, hypoxaemia, lethargy, uncommonly (<5%) diarrhoea, and rarely (<2%) apnoea. | 1. Weak |
| Risk factors (Q2) | 2. Clinicians should take into account the following risk factors for more serious illness when assessing and managing infants with bronchiolitis:<br>• Gestational age <37 weeks;*<br>• Younger chronological age at presentation;*<br>• Prenatal and/or postnatal exposure to tobacco smoke;*<br>• Reduced breastfeeding exposure;*<br>• Faltering growth/ slow weight gain (failure to thrive); | 2. Strong |

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| | • Comorbidities including congenital heart disease, chronic lung disease, chronic neurological condition, congenital diaphragmatic hernia, trisomy 21, and other genetic disorders;<br>• Being an Indigenous infant†;<br>• Being an economically disadvantaged infant;<br>• Timing and severity of illness onset at hospital presentation.<br><br>*Clinicians should judge these as risk factors on a continuous scale; with higher risk of poor outcomes associated with lower gestational age, lower chronological age, fewer days of breastfeeding exposure, and greater tobacco smoke exposure.<br><br>†Indigenous status in itself is unlikely to confer risk but there remains a correlation in Australia and Aotearoa New Zealand with ethnicity and severe bronchiolitis outcomes, independent of socioeconomic status, potentially reflecting the ongoing impacts of colonisation, remote geographical isolation, and the institutional racism in our health systems. | |
| CXR (Q3a-c) | 3a. Do not routinely use CXR in infants presenting or admitted to hospital with bronchiolitis.<br><br>3b. Consider CXR in infants with an unexpected deterioration* and/or a clinical course not consistent with bronchiolitis, including concerns regarding the presence of sepsis, pneumonic consolidation, pneumothorax, empyema, immunodeficiency, pleural effusion, or significant cardiac abnormalities.<br><br>*Unexpected deterioration refers to an unexpected requirement for an escalation of care.<br><br>3c. Consider CXR in infants presenting with bronchiolitis in high dependency/ intensive care settings, where there is clinician diagnostic concern regarding possible sepsis, pneumonic consolidation, pneumothorax, empyema, immunodeficiency, pleural effusion or significant complication of other diseases (e.g., heart failure with congenital heart disease), in order to guide treatment options. | 3a. Conditional<br>  <br>3b. Consensus-based<br>  <br><br>3c. Consensus-based<br>  |
| Laboratory tests (Q4a-c) | 4a. i) Do not routinely use laboratory tests for infants presenting to hospital or hospitalised with bronchiolitis, including bacteriological testing of urine or blood. | 4a. i) Conditional<br>  |

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| | ii) Consider glucose and/or sodium levels during assessment in infants with bronchiolitis and poor feeding, evidence of dehydration or altered mental state.<br><br>4b. Consider use of biomarkers (e.g., FBC, CRP, PCT), urine testing, and blood cultures for the diagnosis of serious bacterial co-infection for infants with unexpected deterioration during hospitalisation with bronchiolitis.<br><br>4c. Consider use of biomarkers (e.g., FBC, CRP, PCT) and blood cultures for diagnosis of serious bacterial co-infection for infants being admitted to ICU with bronchiolitis. | ii) Consensus-based<br>  <br>4b. Consensus-based<br>  <br>4c. Weak<br>  |
| Virological investigations (Q5) | 5. Do not routinely use viral testing in infants presenting to hospital or hospitalised with bronchiolitis, including testing undertaken solely for cohorting of patients. | 5. Conditional<br>  |
| **MANAGEMENT** | | |
| Bronchiolitis scoring systems (Q6) | 6. Do not routinely use a formal bronchiolitis severity scoring system to predict need for admission or hospital length of stay in infants presenting or admitted to hospital with bronchiolitis. | 6. Weak<br>  |
| Criteria for safe discharge (Q7) | 7. Safe discharge from hospital (either from the ED or ward) for infants with bronchiolitis should take into account risk factors (R2), the distance of the family's residence from the hospital and their ability to return, parental health literacy, and the timing of the hospital presentation relative to the natural history of bronchiolitis (R1). Consider patients suitable for safe discharge from hospital when the following criteria are met:<br><br>1. Infant is clinically stable (defined as with mild to moderate stable respiratory effort).<br><br>2. For an infant who has not received oxygen/respiratory support and/or with $SpO_2 \geq 95\%$, there is no need to continue to observe for maintenance of oxygen saturations. The infant may be considered for discharge based on criteria below.<br><br>For an infant who has received oxygen/respiratory support and/or with $SpO_2 \leq 94\%$, they should be observed for maintenance of oxygen saturations in air at the following levels for 3-4 hours, including a period of sleep:<br>i. for infants aged ≥6 weeks with no underlying health conditions, for maintenance of $SpO_2 \geq 90\%$;<br>ii. for infants aged <6 weeks, or infants aged <12 months with an underlying health condition, for maintenance of $SpO_2 \geq 92\%$. | 7. Weak<br>  |

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| | 3. All Infants irrespective of presentation to ED or on inpatient ward should be maintaining adequate oral intake of fluids and feeds of at least 1/2 of usual volume with adequate output (>1/2 of usual wet nappies).<br><br>4. Parents and/or caregivers should feel confident to manage the infant with bronchiolitis at home.<br><br>5. Parents and/or caregivers are educated and provided with written information on possible deterioration and when to return for healthcare review.<br><br>6. Social situation allows discharge to home. The following factors should be considered: social factors, the time of day and suitable transport availability.<br><br>7. Arrange local follow-up where appropriate. | |
| Beta2 agonists (Q8a-b) | 8a. Do not use beta2 agonists in infants (<12 months of age) presenting to hospital or hospitalised with bronchiolitis.<br><br>8b. Do not use beta2 agonists in infants (<12 months of age) presenting to hospital or hospitalised with bronchiolitis, with a personal or family history of atopy outside of a RCT. | 8a. Strong<br>  <br>8b. Strong<br>  |
| Adrenaline/ epinephrine (Q9) | 9. Do not use adrenaline/ epinephrine in infants presenting to hospital or hospitalised with bronchiolitis. | 9. Strong<br>  |
| Hypertonic saline (Q10) | 10. Do not routinely use nebulised hypertonic saline in infants presenting to hospital or hospitalised with bronchiolitis outside of a RCT. | 10. Weak<br>  |
| Glucocorticoids (Q11a-c) | 11a. Do not use systemic or local glucocorticoids in infants with bronchiolitis*.<br>*For guidance on the use of glucocorticoids when SARS-CoV-2 infection is present, refer to R22b 'SARS-CoV-2 treatment.'<br><br>11b. Do not use glucocorticoids for the routine treatment of infants with bronchiolitis with a positive response to beta2 agonists or other markers of a latter asthmatic phenotype outside of a RCT. Beta2 agonists should not be used in infants aged <12 months (see Q8a,b).<br><br>11c. i) Do not routinely use a combination of systemic or local corticosteroids and adrenaline/ epinephrine in infants presenting to or hospitalised with moderate bronchiolitis outside of the ICU setting. | 11a. Strong<br>  <br>11b. Strong<br>  <br>11c. i) Conditional<br>  |

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| | ii) Consider using a combination of systemic or local corticosteroids and adrenaline/epinephrine in infants with severe bronchiolitis requiring ICU level care. | ii) Conditional  |
| Supplemental oxygen and saturation targets (Q12a-b) | 12a. Consider the use of supplemental oxygen in the treatment of hypoxaemic* infants with bronchiolitis.<br><br>*For definitions of hypoxaemic and target oxygen saturation levels, see Q12b ('Oxygen saturation targets').<br><br>12b. Consider the use of supplemental oxygen in infants with bronchiolitis if their oxygen saturation is:<br>• Persistently <90%, for infants aged ≥6 weeks;<br>• Persistently <92%, for infants aged <6 weeks, or infants aged <12 months with an underlying health condition. | 12a. Conditional  <br><br>12b. Weak  |
| Continuous pulse oximetry (Q13) | 13. Do not routinely use continuous pulse oximetry for medical management of non-hypoxaemic infants ($SpO_2$ ≥90% for infants ≥6 weeks age, or $SpO_2$ ≥92% for infants <6 weeks age, or infants aged <12 months an underlying health condition), with bronchiolitis not receiving oxygen, or stable infants receiving low-flow oxygen, who are not at risk of apnoea. | 13. Conditional  |
| HF therapy (Q14) | 14. i) Do not routinely use HF therapy in infants with mild or moderate bronchiolitis who are not hypoxaemic.*<br><br>ii) Do not routinely use HF therapy as a first-line therapy in infants with moderate bronchiolitis who are hypoxaemic.*<br><br>iii) Consider HF therapy in infants with bronchiolitis who are hypoxaemic,* and who have failed low flow oxygen.<br><br>iv) Consider HF therapy in infants with bronchiolitis with severe disease prior to CPAP.<br><br>* For otherwise healthy infants aged ≥6 weeks: $SpO_2$ persistently <90%. For infants aged <6 weeks, or infants aged <12 months with an underlying health condition: $SpO_2$ persistently <92%. | 14. i) Conditional  <br><br>ii) Conditional  <br><br>iii) Conditional  <br><br>iv) Conditional  |
| Chest physiotherapy (Q15) | 15. Do not routinely use chest physiotherapy in infants with bronchiolitis. | 15. Conditional  |
| Suctioning (Q16a-b) | 16a i). Do not routinely use nasal suction in the management of infants with bronchiolitis. | 16a i). Conditional  |

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| | ii). Consider using superficial suctioning in infants who have respiratory distress or feeding difficulties due to upper airway secretions.<br><br>16b. Do not routinely use deep nasal suctioning for the management of infants with bronchiolitis. | ii). Conditional<br>  <br><br>16b. Weak<br>  |
| Nasal saline (Q17) | 17 i). Do not routinely use nasal saline drops in the management of infants with bronchiolitis.<br><br>ii). Consider a trial of intermittent nasal saline drops at time of feeding in infants with reduced feeding. | 17 i). Conditional<br>  <br><br>ii). Conditional<br>  |
| CPAP (Q18) | 18. Consider using CPAP therapy in infants with bronchiolitis and impending or severe respiratory failure, and/or with severe illness. | 18. Conditional<br>  |
| Antibiotic medication (Q19a-c) | 19a. Do not routinely use antibiotics for the treatment of infants with bronchiolitis.<br><br>19b. Do not routinely use azithromycin for treatment of bronchiolitis in infants admitted to hospital.<br><br>19c. Do not routinely use antibiotics for the treatment of bronchiolitis in infants who are at risk of developing bronchiectasis (due to known risk factors such as virus type (e.g., Adenovirus), Indigenous ethnicity, socioeconomic disadvantage). | 19a. Conditional<br>  <br><br>19b. Weak<br>  <br><br>19c. Weak<br>  |
| Non-oral hydration (Q20a-e) | 20a. Use supplemental hydration for infants with bronchiolitis who cannot maintain hydration orally.<br><br>20b. i) Use either NG or IV routes for non-oral hydration in infants admitted to hospital with bronchiolitis requiring supplemental hydration.<br><br>ii) Consider NG as the preferred first method of non-oral hydration in infants with moderate bronchiolitis requiring supplemental hydration.<br><br>iii) Consider either continuous or bolus methods of NG non-oral hydration with oral rehydration solution, breast milk, or formula in infants admitted to hospital with bronchiolitis requiring an NG.<br><br>20c. Consider fluid restriction at 50-75% of recommended maintenance due to the risk of fluid overload from SiADH, and hyponatremia in bronchiolitis. Monitor for signs of overhydration. | 20a. Strong<br>  <br><br>20b. i) Strong<br>  <br><br>ii) Weak<br>  <br><br>iii) Conditional<br>  <br><br>20c. Consensus-based<br>  |

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| | 20d. Consider using either 0.9% sodium chloride (normal saline) with 5% glucose, or balanced fluid (e.g., Plasma-lyte 148™ or Hartmann's solution) with 5% glucose, for use as maintenance fluid in infants admitted to hospital with bronchiolitis requiring IV hydration. For younger infants aged up to 4 weeks corrected with bronchiolitis, consider 10% glucose, or monitoring of blood sugar levels if receiving 5% glucose.<br><br>20e. i) Consider enteral feeding (NG or oral), if tolerated, in infants receiving high flow.<br><br>ii) Consider continuous NG feeding in infants receiving CPAP who are not judged at imminent risk of intubation. | 20d. Consensus-based<br>  <br><br>20e. i) Weak<br>  <br><br>ii) Consensus-based<br>  |
| Infection control practices (Q21) | 21. i) Use hand hygiene practices for the management of infants with bronchiolitis.<br><br>ii) Consider multicomponent infection control practices for the management of infants with bronchiolitis.<br><br>iii) Consider cohorting of infants admitted to inpatient wards with bronchiolitis. | 21. i) Strong<br>  <br><br>ii) Weak<br>  <br><br>iii) Weak<br>  |
| SARS CoV-2 co-infection and treatment (Q22a-b) | 22a. Do not routinely use SARS-CoV-2 status to stratify increased risk for deterioration in infants with bronchiolitis. SARS CoV-2 infection or co-infection does not appear to place infants at increased risk of severe outcome from bronchiolitis.<br><br>22b. i) Consider use of dexamethasone in hypoxic patients presenting with bronchiolitis who are also positive for SARS-CoV-2 co-infection.<br><br>ii) Consider use of remdesivir in immunosuppressed infants who are also positive for SARS-CoV-2 infection. | 22a. Weak<br>  <br><br>22b.<br>i) Consensus-based<br>  <br><br>ii) Consensus-based<br>  |
| **PREVENTION** | | |
| Infant RSV monoclonal antibody prophylaxis (Q23) | 23. i) Consider use of monoclonal antibodies (palivizumab or nirsevimab) during RSV season in infants at increased risk of severe complications with bronchiolitis; chronic lung disease, congenital heart disease, and infants born very preterm (<32 wGA).<br><br>ii) Consider universal nirsevimab as a population-based approach to reduce morbidity due to RSV bronchiolitis. | 23. i) Conditional<br>  <br><br>ii) Conditional<br>  |

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| Maternal active RSV immunisation (Q24) | 24. Consider universal maternal antenatal immunisation with a RSV prefusion F protein-based vaccine as a population-based approach to reduce morbidity due to RSV bronchiolitis. | 24. Conditional  |
| Infant active RSV immunisation (Q25) | 25. Do not routinely use universal infant RSV immunisation. | 25. Weak  |

CPAP = Continuous positive airway pressure; CRP = C-reactive protein; CXR = Chest x-ray; ED = Emergency department; FBC = Full blood count; HF = High flow; ICU = Intensive care unit; IV = Intravenous; NG = Nasogastric; PCT = Procalcitonin; RCT = Randomised controlled trial; RSV = Respiratory syncytial virus; SARS-CoV-2 = Severe acute respiratory syndrome coronavirus 2; SiADH = Syndrome of inappropriate antidiuretic hormone secretion; $SpO_2$ = Peripheral oxygen saturation; UTI = Urinary tract infection, wGA = weeks' gestational age.

## Research recommendations

*Table 7. Research recommendations from the 2025 Australasian Bronchiolitis Guideline update.*

| **DIAGNOSIS** | |
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| Physical examination and history | 1. There is a need for a consensus international definition of bronchiolitis to be developed.<br><br>2. Observational research should be undertaken to evaluate the sensitivity and specificity of clinical signs and symptoms for predicting a bronchiolitis diagnosis. |
| Risk factors | 1. Observational research is needed to investigate the effects of potential new risk factors of severe bronchiolitis, such as maternal vaping.<br><br>2. Large, high quality observational studies are needed to replicate the findings for risk factors and severity outcomes where there is lower quality or limited research (see *Annex E: evidence profiles, chapter two: risk factors, table 4* for risk factors of low quality or limited research). |
| CXR | 1. Studies are needed to investigate the barriers to omitting routine use of CXRs in infants with bronchiolitis, and to develop and evaluate interventions to reduce clinician use of CXRs in this population.<br><br>2. Research is needed to define the clinical factors present in an unexpected deterioration in bronchiolitis, that might result in improved outcomes following the use of CXR.<br><br>3. Research is required to define the clinical factors in bronchiolitis in the high dependency/ intensive care setting that might result in improved outcomes through the use of CXR.<br><br>4. Research is needed to understand barriers to and interventions for guiding the use of CXR in infants with bronchiolitis in the high dependency/ intensive care setting. |
| Laboratory tests | 1. Large, high quality, observational studies are needed to investigate the clinical role of biomarkers for bacterial co-infection (from blood or urine sampling) in infants with bronchiolitis, including in infants with unexpected deterioration or ICU admission. |
| Virological investigations | 1. Adequately powered RCTs are needed on behavioural interventions to reduce routine viral testing in infants with bronchiolitis. |
| **MANAGEMENT** | |
| Bronchiolitis scoring systems | 1. Further studies are needed that compare the reliability, validity, and responsiveness of bronchiolitis scoring systems, to identify which may be best for use in routine clinical practice.<br><br>2. Prospective studies are needed to evaluate the predictive validity of bronchiolitis scoring systems and disease severity calculators in relation to disease severity outcomes, |

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| | such as ICU admission or inter-hospital transfer, and to assess whether their use is associated with reduced length of stay and unnecessary ICU interventions.<br><br>3. External validation studies, including parental opinion, are required on the routine use of bronchiolitis scoring systems in Australasian clinical practice. |
| Criteria for safe discharge | 1. Prospective observational, quantitative and qualitative studies, with the inclusion of consumer voice, including co-design, would be beneficial in further evaluating safe discharge criteria and protocolising criteria. Diverse samples with varying age, socioeconomic status, and background are needed in these studies in the Australasian setting. |
| Beta2 agonists | 1. An individual patient meta-analysis could be considered to explore the effects of beta2 agonists in subgroups from existing data (e.g., older infants (12 to 24 months of age), infants <12 months of age with a personal or family history of atopy, older infants (12 to 24 months of age) with a second or subsequent episode of bronchiolitis or wheeze).<br><br>2. Large, high quality observational studies are needed to identify predictors of a positive response to beta2 agonists in older infants aged 12 to 24 months.<br><br>3. Adequately powered RCTs are needed to understand the effects of beta2 agonists on the clinical outcomes of the following bronchiolitis subgroups:<br>i. Older infants (aged 12 to 24 months);<br>ii. Infants (aged <12 months) with a personal or family history of atopy;<br>iii. Older infants (aged 12 to 24 months) with a second or subsequent episode of bronchiolitis or wheeze. |
| Adrenaline/ epinephrine | 1. Adequately powered RCTs are needed to evaluate adrenaline/epinephrine as a standalone therapy in infants presenting to hospital or hospitalised with severe bronchiolitis (receiving ICU level care). Duration of positive pressure ventilation support should be evaluated as an outcome. |
| Hypertonic saline | 1. Additional, adequately powered RCTs are needed to investigate the effect of hypertonic saline alone on clinical outcomes in infants with bronchiolitis. |
| Glucocorticoids | 1. Adequately powered RCTs of glucocorticoids could be considered in infants with a positive response to beta2 agonists (or other markers of a latter asthmatic phenotype), presenting to hospital or hospitalised with bronchiolitis.<br><br>2. Adequately powered RCTs are needed that assess the effect of glucocorticoids and adrenaline/epinephrine as a combined therapy in infants presenting to hospital or hospitalised with moderate bronchiolitis.<br><br>3. Adequately powered RCTs are needed to investigate the effectiveness of different doses of glucocorticoids and adrenaline/epinephrine combined therapy in infants with severe bronchiolitis receiving ICU level care. |

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| Supplemental oxygen and saturation targets | 1. Adequately powered RCTs with pre-defined indications and protocols for supplemental oxygen are required to determine effects on hospital admission, length of stay, and feeding difficulties in infants with bronchiolitis, as well as medium- and long-term neurodevelopmental outcomes.<br><br>2. Prospective, observational research is needed to investigate the effect of different oygen saturation targets on clinical outcomes (e.g., length of stay), in infants with bronchiolitis in Australasian hospitals. |
| Continuous pulse oximetry | 1. Adequately powered RCTs are needed to assess the effect of intermittent versus continuous monitoring of oxygen saturation levels on clinical outcomes.<br><br>2. Further studies are needed to determine the optimal timing of intermittent saturation monitoring. |
| HF therapy | 1. Further, adequately powered RCTs are needed to evaluate the effect of different HF flow rates on clinical outcomes in infants with bronchiolitis.<br><br>2. Studies are needed to investigate the optimal weaning process for HF therapy in infants with bronchiolitis. |
| Chest physiotherapy | 1. Further adequately powered RCTs are needed to evaluate the effectiveness of rhinopharyngeal retrograde clearance and instrumental clearance techniques in infants with bronchiolitis.<br><br>2. Adequately powered RCTs are needed to investigate the effect of chest physiotherapy techniques in infants with severe bronchiolitis (including mechanically ventilated patients), in Australasian populations, and in infants with pre-existing comorbidities. |
| Suctioning | 1. Adequately powered RCTs are needed to evaluate the effect of suctioning on clinical outcomes (e.g., length of stay) in infants with bronchiolitis. Adverse events should be thoroughly evaluated in these trials.<br><br>2. Adequately powered RCTs are needed to compare the effect of superficial versus deep suctioning on length of stay in infants with bronchiolitis. |
| Nasal saline | 1. Adequately powered RCTs are needed to evaluate the effectiveness of nasal saline and suctioning, including with longer outcomes such as length of stay. |
| CPAP | 1. Adquately powered RCTs are needed to evaluate the use of CPAP in infants with bronchiolitis. |
| Antibiotic medication | 1. No further trials need to be undertaken of non-macrolide antibiotics for mild or moderate bronchiolitis.<br><br>2. Further adequately powered RCTs should be considered of macrolide and non-macrolide antibiotics for severe bronchiolitis in the ICU environment.<br><br>3. Hospital length of stay associated with azithromycin should be investigated as a primary outcome in further adequately powered RCTs in infants with bronchiolitis. |

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| | 4. Adequately powered RCTs may be warranted in high risk groups in which there may be clinical benefit to using azithromycin (e.g., to evaluate whether azithromycin reduces wet cough).<br><br>5. More adequately powered RCTs should use standard treatment dosing when evaluating azithromycin.<br><br>6. Long-term follow-up studies are needed examining patients at risk of bronchiectasis provided with antibiotics. |
| Non-oral hydration | 1. Studies are needed to determine the appropriate level of dehydration and reduced intake to start non-oral hydration.<br><br>2. Further adequately powered RCTs are required comparing use of NG versus IV hydration for infants with severe bronchiolitis.<br><br>3. Studies are required that assess the clinical effects of levels of fluid restriction.<br><br>4. Studies are needed to determine the most suitable isotonic IV fluid for use in severe bronchiolitis.<br><br>5. Research is needed to compare the effects of intermittent versus bolus feeding, and NG versus oral feeding in infants receiving HF therapy. |
| Infection control practices | 1. Adequately powered RCTs are needed to evaluate the effects of infection control practices on nosocomial infections, length of stay, and adverse events, as to date, all of the evidence is from observational studies.<br><br>2. Studies are needed to evaluate the cost-effectiveness of specific infection control measures. |
| SARS-CoV-2 co-infection and treatment | 1. Further observational research is required on the incidence and severity of bronchiolitis in infants infected with current SARS-CoV-2 variants in Australia and Aotearoa New Zealand.<br><br>2. Adequately powered RCTs for dexamethasone and remdesivir in infants with bronchiolitis who are positive with SARS-CoV-2 infection should be a priority. |
| **PREVENTION** | |
| Infant RSV monoclonal antibody prophylaxis | 1. Further adequately powered RCTs involving direct comparisons of palivizumab versus nirsevimab in infants at increased risk of severe complications with bronchiolitis are urgently required.<br><br>2. Further adequately powered RCTs comparing nirsevimab verus placebo with long-term follow-up data are required.<br><br>3. Cost-effectiveness evaluations of palivizumab and nirsevimab are required in the Australasian context. |

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| Maternal active RSV immunisation | 1. Studies evaluating the cost-effectiveness of maternal RSV vaccines in Australia and Aotearoa New Zealand should be undertaken.<br><br>2. Optimal timing for the administration of the RSV vaccine in pregnancy requires further investigation.<br><br>3. Use of RSV vaccines alongside pertussis and influenza vaccines during pregnancy requires further investigation.<br><br>4. Phase 4 surveillance studies should further define the risk, if any, of preterm birth with RSV prefusion F protein-based vaccines.<br><br>5. Research is needed to assess requirements and timing of re-vaccination for subsequent pregnancies. |
| Infant active RSV immunisation | 1. Additional phase 2 and 3 RCTs of RSV infant candidate vaccines should be undertaken. |

CPAP = Continuous positive airway pressure; CXR = Chest x-ray; ICU = Intensive care unit; IV = Intravenous; NG = Nasogastric; RCT = Randomised controlled trial; RSV = Respiratory syncytial virus; SARS-CoV-2 = Severe acute respiratory syndrome coronavirus 2.

# Dissemination, implementation, and evaluation

## Dissemination

The guideline will be disseminated in print and freely available electronically via the PREDICT website (www.predict.org.au). This will include all scoping question profiles (in PICO format), GRADE evidence tables, narrative descriptions of the evidence, evidence-to-recommendation tables (considerations of values, preferences and feasibility) and references for all evidence that was considered for each PICO question. A bedside guideline (quick reference 20 page document) will also be freely available via the PREDICT website.

Notification of the updated guideline with links to the PREDICT website will be circulated via all relevant paediatric and emergency craft groups across Australia and Aotearoa New Zealand, including those who gave feedback on and endorsed the guideline.

Communication with relevant regional guideline groups and Australasian hospitals who have their own bronchiolitis guideline will be undertaken, aiming to optimise prompt alignment of other guidelines to the updated PREDICT bronchiolitis guideline recommendations.

Dissemination will be supported by publication of selected systematic reviews and evidence in peer-reviewed journals, presentations and workshops at key conferences and events.

Communication with relevant local and international providers of paediatric emergency medicine content (e.g. Don't Forget the Bubbles) will be undertaken.

General paediatric and emergency medicine leaders will be encouraged to notify clinicians via email, newsletters, and/or team meetings of the revised guideline, and to promote awareness via desktop icons, screen savers, and/or posters in departments.

## Implementation

### *Facilitators and barriers*

For each of the PICO questions, the GDC/GAG considered the balance of benefits and harms, resource implications, feasibility in the Australasian context, acceptability to key interest-holders, values and preferences and, equity and human rights. Acceptability to families/caregivers was particularly challenging to clarify as there is a dearth of research aiming to understand parental values and preferences for bronchiolitis care in Australasia. Therefore, a qualitative study is currently being performed alongside the guideline development to determine the experience of families/caregivers (with equal representation of Māori and Pacific infants in Aotearoa New Zealand) whose infants presented to or were admitted to hospital with bronchiolitis. The results of this research will be incorporated into guideline recommendations.

Barriers and facilitators to the evidence-based management of infants with bronchiolitis were previously identified from a PREDICT qualitative study of Australasian clinicians (nurses and doctors) (330, 331). Key barriers were around beliefs about consequences (e.g. misdiagnosis), knowledge and skills in managing infants with bronchiolitis (e.g. lack of experience and confidence), and social influences (e.g. pressure from families and other clinicians to 'do something') with facilitators including having an evidence-based guideline and, nurses playing a key role in directing patient care,

particularly in after-hour periods and with junior doctors. These factors were considered for each of the recommendations by the GDC/GAG.

### *Implementation tools and advice*

#### *Tools:*

The full guideline and bedside clinical summary will be available freely on the PREDICT website (www.predict.org.au).

#### *Targeted implementation materials:*

Following development of the first PREDICT Australasian Bronchiolitis guideline in 2016, implementation materials (including scripted educational materials, clinical champions, and audit and feedback) were developed that targeted previously identified barriers and facilitators to evidence-based bronchiolitis management (332). These implementation interventions were evaluated in a cluster RCT and found to significantly improve compliance with five key evidence-based guideline recommendations (333). These materials will be updated in response to the new evidence, and materials focusing on the use of HF therapy will be developed targeting the identified barriers and enablers to its appropriate use. These materials will be available via the PREDICT website.

The paediatric care gap between metropolitan and regional and rural hospitals is associated with a disparity in health outcomes for regional and rural children in Australia and Aotearoa New Zealand. As part of a Medical Research Future Fund (MRFF) program of research (Regional and Rural Translation-Bronchiolitis (RART-Bronch) study), we will improve bronchiolitis management in Australian settings by developing targeted implementation materials including context-specific education, and an online benchmarking and feedback platform.

### *Resource implications*

Resource implications were considered during the development of each recommendation as part of the Evidence-to-Recommendation framework by the GDC and the GAG. For certain topics, this information was supplemented with peer-reviewed evidence on cost-effectiveness, where this was determined *a priori* as likely to be an important outcome when considering the evidence.

## Monitoring and evaluating the impact of the guideline

A monitoring and evaluation framework containing clearly defined criteria, key clinical indicators, and an audit tool will be developed for health services to measure their performance against evidence-based recommendations as part of the MRFF RART-Bronch project. This will be made freely available to all hospitals in Australasia via PREDICT.

## Updating the guideline

Following release of the guideline it is anticipated that approximately four key PICO questions/subject areas will be incorporated into a programme of a “living guideline” with regular literature review and refining of recommendations as appropriate. The questions and subject areas to be reviewed, as well as the “living guideline” process to be utilised will be published via the PREDICT website. When the living guideline updates result in changes to specific guideline recommendations that will have an impact on clinical practice, targeted implementation and

dissemination strategies will be developed. Following this process the guideline will be reviewed in its entirety by the GDC to determine appropriateness of a major review of the evidence.

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