

Aim: To improve compliance with AAP published guidelines for the management of bronchiolitis in infants.

DEFINITION

Bronchiolitis is a clinical diagnosis, caused by a variety of viruses in children <2 years old. Patients typically have runny nose, cough, wheezing/crackling, trouble breathing and/or fever.

Albuterol is **NOT** routinely recommended for bronchiolitis. Consider one-time albuterol trial if persistent wheezing after suctioning AND:

- Age > 6 mo. and personal history of wheezing or eczema or immediate family history of asthma/asthma
- Not indicated if < 6 mo.

Clinical improvement per provider
(e.g., improved respiratory rate, work of breathing, wheezing/air movement)

Yes

No

"Albuterol responsive"
Consider albuterol prn

"Non-responder"
No further bronchodilators

EXCLUSION GUIDELINES

Patients **excluded** from this guideline:

- Cardiac disease
- Chronic lung disease
- Critically ill
- Neurologic impairment
- Immunodeficiency
- Genetic difference

Step 1: Initial assessment

1. Contact/droplet precautions
2. Suction
3. Start O₂ for sustained sats < 90%*
4. PO liquid trial if poor PO

The following are NOT routinely recommended in AAP guidelines:

- Viral testing**
- 3% saline or racemic epi
- Albuterol
- Antibiotics
- Chest Physiotherapy
- Corticosteroids
- CXR

Refer to **Note 1** for further guidance on above interventions

Any of the following present after step 1?

- High work of breathing (WOB)
- Sustained O₂ sats < 90%*
- Failed PO trial and signs of dehydration (needs IVF/NG)
- Barrier to outpatient management
- History of apnea at home

No

Yes

Discharge home (consider follow-up in 2-3 days if not improving)

- Consider albuterol for home use only if "responder"
- Review anticipatory guidance and supportive cares
- Educate on suctioning at home options
- Update immunizations if applicable

Transfer to Emergency Department via EMS.
612-813-2121

Once the decision has been made to admit the patient, please discuss additional non-urgent tests/treatments (e.g. CXR) with admitting provider

*Pulse-oximeters may overestimate O₂ saturation in patients with higher melanin content by 1-2 points.

**Test for COVID-19 if indicated per most recent testing guidelines. Test for influenza if high community prevalence. Consider RSV testing for infants < 28 day with fever. Admission should not be delayed while awaiting results of viral testing (e.g., COVID-19).

EXCLUSION GUIDELINES

Patients **excluded** from this guideline:

- Cardiac disease
- Chronic lung disease
- Critically ill
- Neurologic impairment
- Immunodeficiency
- Genetic difference

Aim: To improve compliance with AAP published guidelines for the management of bronchiolitis in infants.

Initial assessment

- Contact/droplet precautions
- **Assess – Suction - Reassess**
- Start LFNC O₂ for sustained (5 min) sats < 90% or immediately for sats < 85%*
- IVF/NG if poor PO (Note 2), high work of breathing (WOB), dehydrated

PAUSE- MD, RT, nurse discuss to confirm patient has received:

- Adequate suctioning
- Antipyretics if indicated
- Rehydration if needed (IV/NG or oral)
- Comfort measures (caregiver holds, dim lights)
- LFNC oxygen if indicated

After PAUSE completed, reassess the patient in 15-30 minutes

Any of the following present on re-evaluation?

- High WOB (consider VBG or CBG if concerns for insufficient ventilation)
- On supplemental O₂ or sustained O₂ sat < 90% for >5 min or any sat < 85%*
- Requires IVF/NG
- Barrier to outpatient management
- History of apnea at home

Albuterol is NOT routinely recommended for bronchiolitis. Consider one-time albuterol trial if persistent wheezing after suctioning AND:

- Age > 6 mo. and personal history of wheezing or eczema or immediate family history of asthma/atopy
 - Not indicated if < 6 mo.
- Patient has severe illness or is decompensating

Assess for improvement in RR, WOB, wheezing/air movement, and document response. Discontinue if not effective.

The following are NOT routinely recommended in AAP guidelines:

- Viral testing**
- 3% saline or racemic epi
- Albuterol
- Antibiotics
- Chest physiotherapy
- Corticosteroids
- CXR

Refer to **Note 1** for further guidance on above interventions



No

Yes

Discharge home (follow-up with PCP)

- Consider albuterol for home use only if "responder"
- RN educate on suctioning at home options

Continue supportive cares as indicated and admit to the hospital. Once the decision has been made to admit the patient, please discuss additional non-urgent tests/treatments (e.g. CXR) with admitting provider. See note 1.**
Consider weight-based high flow nasal cannula (refer to HFNC guideline) if any of the following:

- Persistently high WOB after PAUSE
- Hypoxia not responding to nasal cannula*
- Elevated pCO₂

Any of the following present?

- Apnea (multiple episodes or requiring intervention)
- Persistently high WOB on max HFNC
- Concern for impending respiratory deterioration

No

Yes

Admit to med-surg/observation

Consider PICU admit and need for RAM cannula, CPAP, BiPAP

*Pulse-oximeters may overestimate O₂ saturation in patients with higher melanin content by 1–2 points.
**Test for COVID-19 if indicated per most recent testing guidelines. Test for influenza if high community prevalence. Consider RSV testing for infants < 28 day with fever. Admission should not be delayed while awaiting results of viral testing (e.g., COVID-19).

Aim: To improve compliance with AAP published guidelines for the management of bronchiolitis in infants.

EXCLUSION GUIDELINES

Patients excluded from this guideline:

- Cardiac disease
- Chronic lung disease
- Critically ill
- Neurologic impairment
- Immunodeficiency
- Genetic difference

Routine management:

- Contact/droplet precautions
- Assess feeding/hydration status (See note 2)
- Antipyretics as indicated for fever or discomfort*
- Continuous pulse-ox if on O₂ support
- Provide O₂ support for sats < 90% sustained for >5 min or any sat <85%**
- Bedside RN to do nasal suctioning at least q4 hours by least invasive means
- Respiratory assessment q2h by RT or RN until no longer increasing O₂ needs and no increase in work of breathing (WOB) for 2 consecutive assessments
- Consider weight-based high flow nasal cannula (see HFNC Guideline) if:
 - Persistently high WOB on reassessment or
 - Hypoxia not responding to regular nasal cannula or
 - Elevated pCO₂

The following are NOT routinely recommended in AAP guidelines:

- Viral testing***
- 3% saline or racemic epi
- Albuterol
- Antibiotics
- Chest physiotherapy
- Corticosteroids
- CXR

Refer to **Note 1** for further guidance on above interventions

Wean as tolerated:

- Wean O₂ to keep sats ≥ 90**, use HFNC weaning protocol if applicable
- Turn off continuous pulse ox when stable on room air (≥ 90%** for 1 hour
- Intermittent spot checks (including while asleep) when not on O₂ support
- Discontinue IVF if taking good PO
- Bulb suction or nasal aspirator PRN
- Begin discharge planning and education

Consider discharge if all completed:

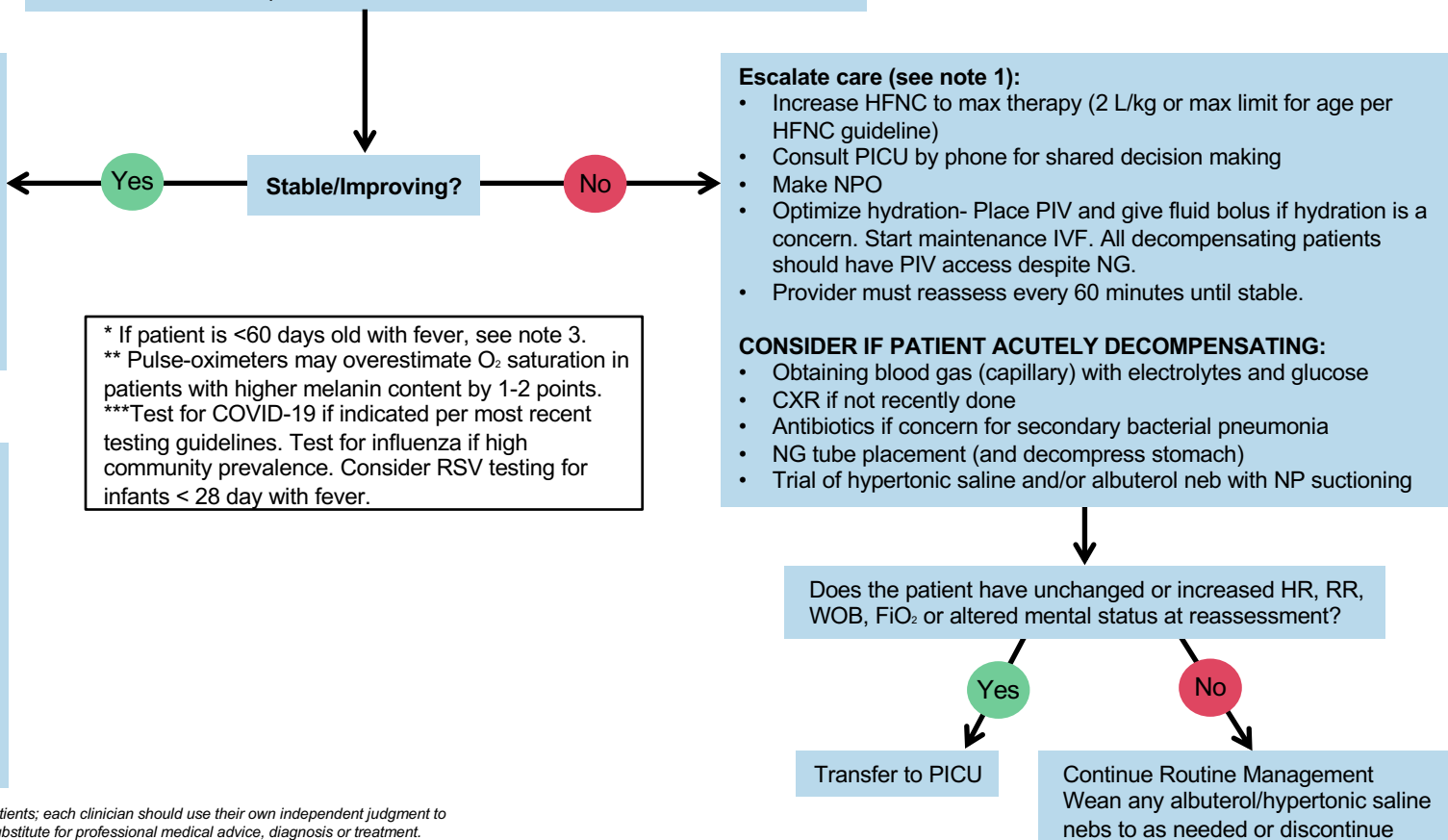
- O₂ sat ≥ 90%** on room air for 6 hours (nap not required). Consider discharge on home oxygen if requiring prolonged supplemental O₂ (see note 4)
- Stable or decreasing needs for suctioning
- RN education on suctioning options in home setting
- No apnea >24 hours
- Taking adequate PO to maintain hydration

Escalate care (see note 1):

- Increase HFNC to max therapy (2 L/kg or max limit for age per HFNC guideline)
- Consult PICU by phone for shared decision making
- Make NPO
- Optimize hydration- Place PIV and give fluid bolus if hydration is a concern. Start maintenance IVF. All decompensating patients should have PIV access despite NG.
- Provider must reassess every 60 minutes until stable.

CONSIDER IF PATIENT ACUTELY DECOMPENSATING:

- Obtaining blood gas (capillary) with electrolytes and glucose
- CXR if not recently done
- Antibiotics if concern for secondary bacterial pneumonia
- NG tube placement (and decompress stomach)
- Trial of hypertonic saline and/or albuterol neb with NP suctioning



* If patient is <60 days old with fever, see note 3.
 ** Pulse-oximeters may overestimate O₂ saturation in patients with higher melanin content by 1-2 points.
 ***Test for COVID-19 if indicated per most recent testing guidelines. Test for influenza if high community prevalence. Consider RSV testing for infants < 28 day with fever.

Disclaimer: This guideline is designed for general use with most patients; each clinician should use their own independent judgment to meet the needs of each individual patient. This guideline is not a substitute for professional medical advice, diagnosis or treatment.

NOTE 1: Escalation of care evidence-based recommendations**Bronchodilators**

- Clinicians should NOT administer albuterol (or salbutamol) as part of routine treatment to infants and children with a diagnosis of bronchiolitis
- If a child has history of asthma or features suggestive of asthma, you may trial albuterol neb/MDI with reassessment after trial.* If not helpful, albuterol should be discontinued
- If child is decompensating or has severe bronchiolitis, it is reasonable to trial albuterol with reassessment after trial.* If not helpful, albuterol should be discontinued
- *For any first albuterol administration, bedside nurse/RT must document in iView if improvement in RR, work of breathing, and wheezing/air movement and provider should reference the trial result in their note.

Chest physiotherapy

- Chest Physiotherapy is NOT routinely recommended in patients with bronchiolitis

Steroids

- Steroids are NOT routinely recommended for children with bronchiolitis, even in the presence of wheezing
- For kids that you suspect recurrent viral wheezing responsive to albuterol or asthma pathology:
 - Steroids should NOT be used in infants < 6 months
 - Systemic steroids should only be used in children > 6 months who have had at least 1 prior albuterol-responsive wheezing episode and/or you suspect have albuterol-responsive wheezing or asthma pathophysiology

Chest X-ray

- Avoid CXR unless need to rule out other diagnosis (e.g. cardiac disease or high suspicion for bacterial pneumonia) (Choosing Wisely). Consider obtaining CXR when:
 - Secondary worsening after initial improvement from viral illness (e.g. new high fever late in illness)
 - Persistent focality on exam
 - Hypoxia out of proportion to other clinical signs
 - Not improving as expected
 - Patient is going to ICU and conversation with ICU physician leads to CXR
 - Consider if hepatomegaly or concern for cardiac disease

Hypertonic saline nebs

- Hypertonic saline nebs should NOT be administered to patients with bronchiolitis in the ED
- Hypertonic saline treatments should NOT be given routinely in hospitalized bronchiolitis patients
- Hypertonic saline nebs may be trialed in hospitalized patients with prolonged stay (>3 days) or patients who are acutely decompensating
- When given, consider using hypertonic saline nebs in conjunction with a bronchodilator to help minimize minor adverse events like bronchospasm, agitation, and bradycardia

Recommendations are consistent with the AAP 2014 Bronchiolitis Clinical Practice Guideline¹ with supplemented information from additional resources (see references section).

NOTE 2: Fluid administration

Fluid administration via NG or IV should be considered in children who are unable to tolerate PO intake or severely dehydrated. NG hydration is an effective and safe way of hydration and often requires less attempts for placement compared to IV. Recommend shared decision making with family. NG can also be used for decompression.

NOTE 3: Fever in patients ≤ 60 days old with bronchiolitis

Bacterial infection is **rare** in patients with bronchiolitis.

In admitted infants with bronchiolitis and fever who are otherwise **well-appearing**, consider the following:

- Age ≤ 28 days: Obtain UA, urine culture, blood culture, CBC, Procalcitonin. LP and empiric antibiotics not routinely recommended if: WBC < 15000 and > 5000 , ANC < 10000 , and procalcitonin within expected range.
- Age 29–60 days: Obtain urinalysis and urine culture. Blood culture, LP, and empiric antibiotics not routinely recommended.

NOTE 4: Discharge on home oxygen

Contact case manager for DME and Pulm as early as possible to arrange for home oxygen and follow-up.

Consider discharge on home oxygen if the following criteria are met:

- Patient requires $\leq 1L/min$ 100% O₂ to maintain O₂ sats $\leq 90\%$
- Normal or only mildly increased work of breathing for 24 hours
- Hydration supportable by oral intake
- Private transportation, family phone and outpatient follow-up guaranteed.

1. Clinical practice guideline: the diagnosis, management, and prevention of bronchiolitis. *Pediatrics*. 2014 Nov;134(5):e1474-502. doi: 10.1542/peds
2. Fernandes RM, Bialy LM, Vandermeer B, Tjosvold L, Plint AC, Patel H, Johnson DW, Klassen TP, Hartling L. Glucocorticoids for acute viral bronchiolitis in infants and young children. *Cochrane Database of Systematic Reviews* 2013, Issue 6. Art. No.: CD004878. DOI: 10.1002/14651858.CD004878.pub4
3. Friedman J N, Davis T, Somaskanthan A, Ma A. Avoid doing chest x rays in infants with typical bronchiolitis *BMJ* 2021; 375 :e064132 doi:10.1136/bmj-2021-064132
4. Gray S, Lee. B, Levy M, et al. Oral feeding on high-flow nasal cannula in children hospitalized with bronchiolitis. *Hospital Pediatrics* (2023) 13 (2): 159–167. <https://doi.org/10.1542/hpeds.2022-006740>
5. “In Infants and Young Children with Acute Viral Bronchiolitis, What Are the Effects of Glucocorticoids?” *Cochrane Clinical Answers*, 2013, <https://doi.org/10.1002/cca.257>
6. Moschino, Laura, et al. “Is Nasal Suctioning Warranted before Measuring o2 Saturation in Infants with Bronchiolitis?” *Archives of Disease in Childhood*, vol. 101, no. 1, 2015, pp. 114–115, <https://doi.org/10.1136/archdischild-2015-309587>
7. Mussman, Grant M., et al. “Suctioning and Length of Stay in Infants Hospitalized with Bronchiolitis.” *JAMA Pediatrics*, vol. 167, no. 5, 2013, p. 414, <https://doi.org/10.1001/jamapediatrics.2013.36>
8. Oakley, Ed, et al. "Nasogastric hydration versus intravenous hydration for infants with bronchiolitis: a randomized trial." *The Lancet Respiratory medicine* 1.2 (2013): 113-120.
9. Rodríguez-Martínez CE, Nino G, Castro-Rodríguez JA, Acuña-Cordero R, Sossa-Briceño MP, Midulla F. For which infants with viral bronchiolitis could it be deemed appropriate to use albuterol, at least on a therapeutic trial basis? *Allergol Immunopathol (Madr)*. 2021 Jan 2;49(1):153-158. doi: 10.15586/aei.v49i1.12. PMID: 33528944; PMCID: PMC8850933
10. Ringer, Coral N, et al. “Physiologic Effects of Nasal Aspiration and Nasopharyngeal Suctioning on Infants with Viral Bronchiolitis.” *Respiratory Care*, vol. 65, no. 7, 2020, pp. 984–993, <https://doi.org/10.4187/respcare.07269>
11. Roque i Figuls, M., Gine-Garriga, M., Granados Rugeles, C., Perrotta, C., & Vilaro, J. (2016). Chest physiotherapy for acute bronchiolitis in paediatric patients between 0 and 24 months old. *Cochrane Database of Systematic Reviews*, 2, CD004873. doi:https://dx.doi.org/10.1002/14651858.CD004873.pub5
12. Seattle Children’s Hospital, Chang, P., Abrams, L., Burns, B., Di Blasi, R., Herrman, A., Lein, M., Roberts, J., Migita, D., 2020 December. *Bronchiolitis Pathway*. Available from <https://www.seattlechildrens.org/pdf/bronchiolitis-pathway.pdf>
13. Weisgerber, Michael C., et al. “Factors Predicting Prolonged Hospital Stay for Infants with Bronchiolitis.” *Journal of Hospital Medicine*, vol. 6, no. 5, 2011, pp. 264–270, <https://doi.org/10.1002/jhm.903>
14. Zhang L, Mendoza-Sassi RA, Wainwright CE, Aregbesola A, Klassen TP. Nebulized hypertonic saline solution for acute bronchiolitis in infants. *Cochrane Database of Systematic Reviews* 2023, Issue 4. Art. No.: CD006458. DOI: 10.1002/14651858.CD006458.pub5
15. AAP VIP HI-FLO: High flow interventions to facilitate less overuse. [HiFlo v4 on Vimeo](#) Retrieved 8/4/2023.
16. Choosing Wisely, American Academy of Pediatrics – Section on Emergency Medicine and the Canadian Association of Emergency Physicians. (2022, December 1). *Five Things Physicians and Patients Should Question* [Press release]. <https://www.aap.org/en/news-room/news-releases/aap/2022/choosing-wisely-five-things-physicians-and-patients-should-question-in-the-practice-of-pediatric-emergency-medicine/>