

Weight Based Guidelines

Age	0-24 Months	2-10 Years	>10 Years
Initial Flow Rates*	2 L/kg/min	1 L/kg/min	1 L/kg/min
Max Flow Rates**	2 L/kg/min up to 15 L/min (i.e. 3 kg = 6 L/min, 8 kg = 15 L/min)	1 L/kg/min up to 20 L/min (round up to the nearest 5 L/min; i.e. 12 kg = 15 L/min)	1 L/kg/min up to 30 L/min

* If patient experiences discomfort with initial flow rate, may reduce by 20% and reassess. For nasal cannula size, equipment and skin care consideration, see notes 1 and 2.

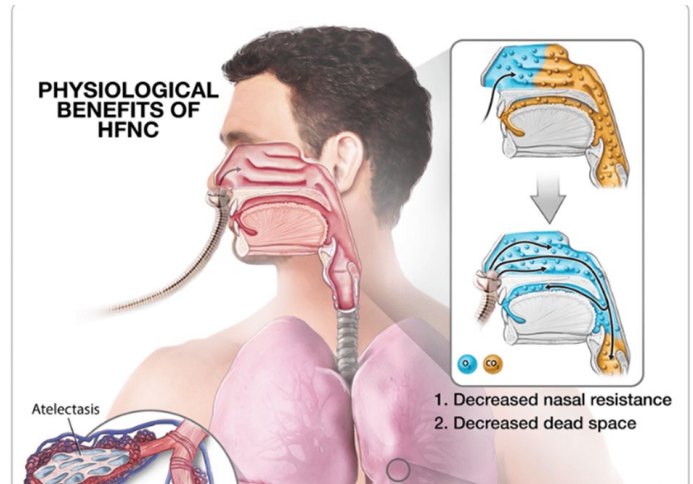
** Patients who are placed on maximal flow rates must show improvement (HR, RR, work of breathing, SpO₂ ≥90%) within 60 minutes or transfer to a higher level of care should be initiated. **FiO₂ must be ≤60% to be admitted to the med/surg floor. L/kg listed is the max per weight and the L/min is absolute max for age for med/surg.**

HFNC Does NOT (Note 3)

- Provide significant positive end-expiratory pressure or PEEP (1-2 L/kg provides a MAX of 2-4 cmH₂O pharyngeal pressure under controlled settings) ⁴
- Reliably improve nasal secretions
- Decrease length of stay or risk of escalation for *mild* increased work of breathing

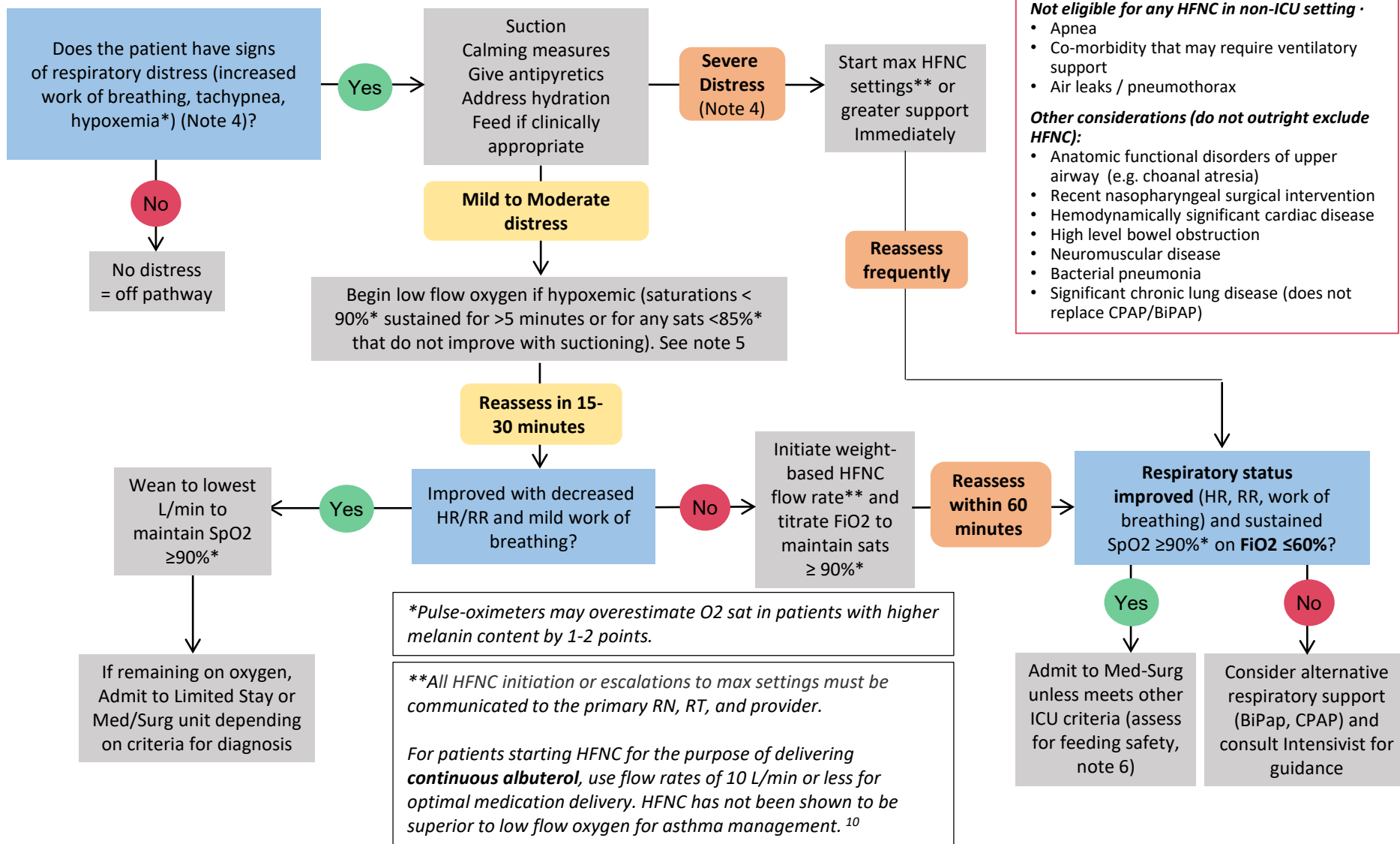
Physiologic Benefit: The Why

- Weight based flow can reduce work of breathing in patients with moderate to severe respiratory distress ¹
- Weight based HFNC is a safe and well-established practice across pediatric hospitals
- There is no evidence for increase in pneumothorax, PICU transfer, or intubation (up to 2 L/kg)
- Can deliver higher FiO₂ in patients who are unable to maintain saturations with regular nasal cannula.



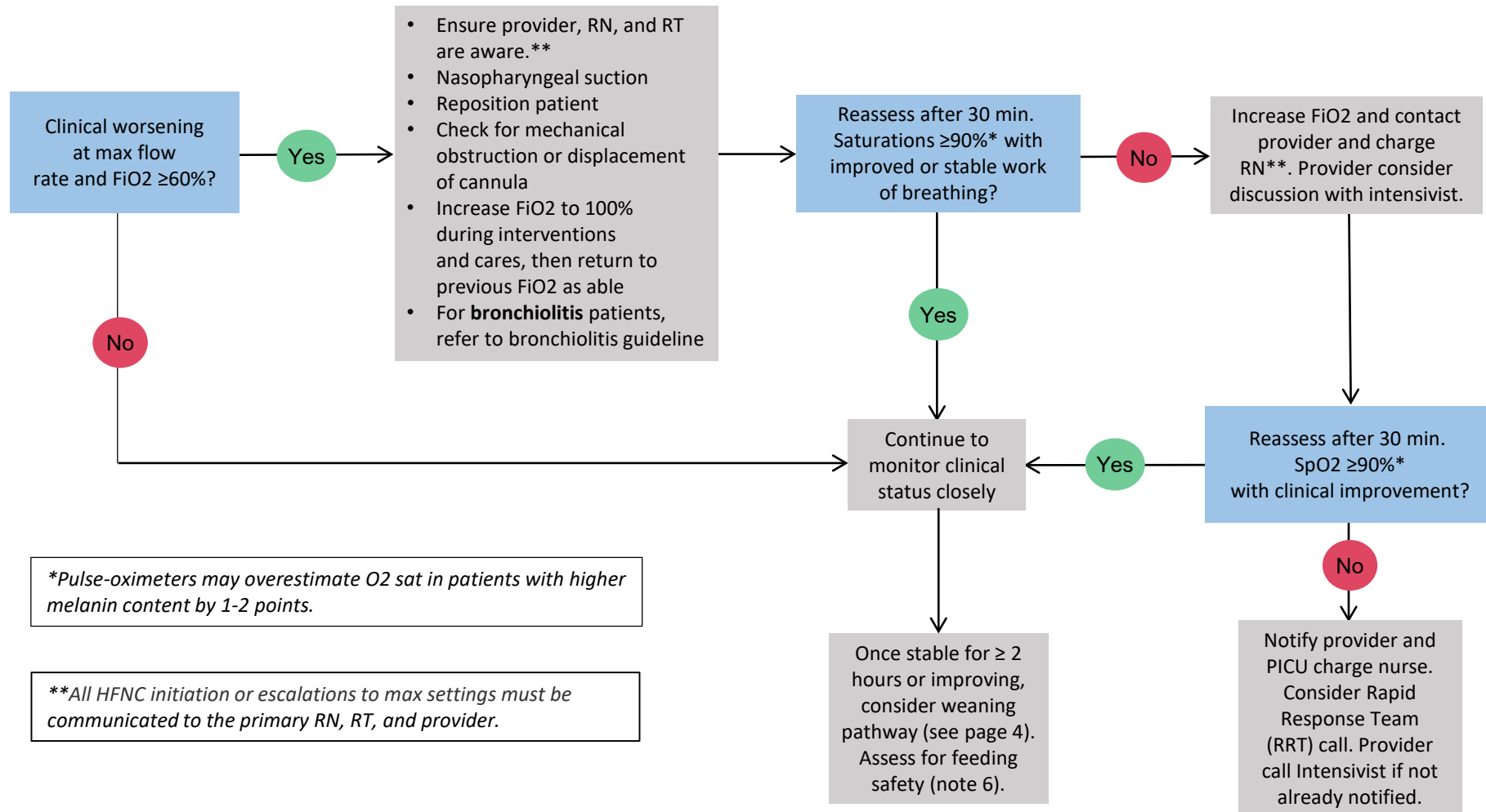
Alsharani, M, et. Al. (2020) Benefits of HFNC, reprinted with permission. Available from <https://doi.org/10.21203/rs.3.rs-111258/v1>

Aim: To standardize approach to the initiation, escalation, and weaning for high flow nasal cannula oxygen.

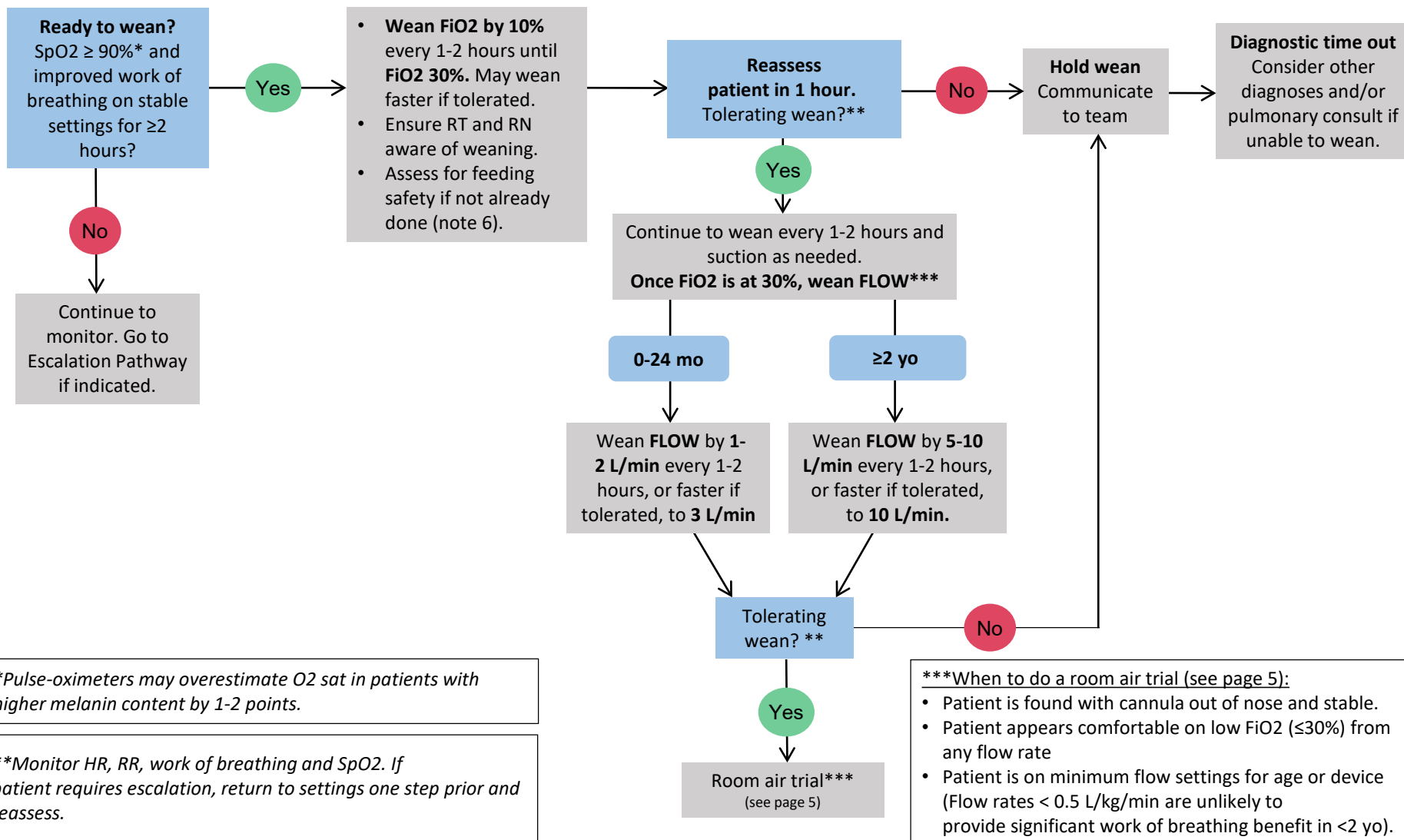


Disclaimer: This guideline is designed for general use with most patients; each clinician should use their own independent judgment to meet the needs of each individual patient. This guideline is not a substitute for professional medical advice, diagnosis or treatment.

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Patient meets criteria for a room air trial with one of the following:

- Found with cannula out of nose and stable.
- Comfortable on low FiO₂ (≤30%) from any flow rate
- Stable on minimum HFNC settings for age or device. (Flow rates < 0.5 L/kg/min are unlikely to provide significant work of breathing benefit in <2 yo)

Perform room air trial:

- Turn HFNC machine off
- Remove nasal cannula from nares (may leave stickers in place)
- Monitor work of breathing and oxygen saturation.

How did patient respond to room air trial?

- Monitor HR, RR, work of breathing, and SpO₂ and assess for 15 minutes.
- If patient requires escalation, return to settings one step prior and reassess.
- RN/RT to document room air response in iView and notify team of results.

Stable on room air

Transition to spot check pulse-ox after 1 hour

Saturations <90%* but work of breathing stable

Start **low flow nasal cannula (LFNC)** at ½ L/min and escalate as needed to achieve sats ≥90% (Note 5). Can repeat room air trial after ≥2 hours of stability and meets criteria for room air trial.

If patient continues to require LFNC, but is otherwise stable, assess for home oxygen therapy eligibility (contact pulmonary, case management)

HR/RR elevated above age-appropriate norms or increase in work of breathing

0-24 months old

Resume previous HFNC settings until stable, then resume wean. Can repeat room air trial after ≥2 hours of stability and meets criteria for room air trial.

≥2 yo (on Optiflow)

Resume previous HFNC settings until stable then continue wean. If ≤ 10 L/min, transition to MR850 then decrease by 2 L/min every 1-2 hours, or faster if tolerated. Can repeat room air trial after ≥2 hours of stability and meets criteria for room air trial.

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

Note 1: Equipment considerations

- Select the cannula size carefully (~70% of nare diameter) so as not to totally occlude patient nares.
- The pop off will prevent excessive pressures in the chamber.
- Set humidifier on invasive mode. Monitor patient temp and system rain out. Invasive mode should be selected for all patient needs (gas is delivered at 37 degrees C and 44 mg/L). The displayed temp will be approximately 37 degrees C in this mode. If excessive rain out affects the patient's tolerance of the system, change to the non-invasive mode.

Note 2: Skin assessment

- Thoroughly inspect the skin beneath and around the oxygen device at least every 4 hrs or with cares (i.e. back of the ears, bridge of the nose and nares)
- Apply skin barrier product per unit guidelines/skin team recommendation.
- Educate patient and caregiver on the importance of frequent skin inspection
- The RN and RT are responsible for inspection and documentation of skin integrity around and under oxygen administration devices. Notify skin team for any abnormal skin assessment.

Note 3: Special considerations

- HFNC is not meant to be a substitute for patients requiring positive pressure (CPAP), specifically in patients with rapidly progressive respiratory distress or impending respiratory failure.
- Caution should be used in patients with functional or anatomical bowel obstruction. HFNC may cause abdominal distention due to the distending airway pressures (up to 2-4 cm H₂O).
- Caution should be used in patients with upper airway abnormalities (choanal atresia, cleft lip/ palate).
- **WARNING:** Heated Humidified Nasal Cannula (HFNC) systems may generate back pressure and create a CPAP-like affect. The amount of distending pressure generated by the HFNC depends on the size of the cannula, the flow rate, and the anatomy of the patient's airway.

Note 4: Clinical assessment

	Reassuring	Monitor	Very concerning
Heart rate	Normal	Mild tachycardia	Severe tachycardia or bradycardia
Respiratory rate	Normal	Mild tachypnea	Severe tachypnea or bradypnea
Pulse oximetry*	≥90% on room air	86-89% on room air (start LFNC if >5 min)	≤85% on room air (start oxygen immediately)
Work of breathing	Normal	Mild-moderate retractions	Severe retractions, head bobbing, grunting
Breath sounds	Good air movement	Decreased air movement, scattered crackles/ wheeze	Markedly decreased or absent air movement, diffuse crackles/wheeze
Level of interaction	Normal	Less interactive than normal, fussy but consolable	Obtunded, inconsolably fussy/irritable
Perfusion	Normal	Cool distal extremities, cap refill 3-4 seconds	Cold extremities, cap refill ≥5 seconds

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

Note 5: Low Flow nasal cannula recommendations

- Begin supplemental oxygen for oxygen saturations <90% sustained for >5 minutes or for any saturations ≤85% that do not improve with suctioning.

MAX AGE-BASED LOW FLOW OXYGEN SETTINGS		
Age	*Max dry oxygen flow rate	
	**NC	Mask
0-12 months	2 L/min	5 L/min
1-8 years	4 L/min	10 L/min
>8 years	6 L/min	10 L/min
*Recommended flow rates for long-term use (>24 hours); may consider higher rates for short-term use as indicated. **Nasal cannula (NC) is the recommended delivery system outside ED		

Note 6: Feeding on HFNC

- Enteral nutrition helps bodies heal. ^{7, 8}
- Oral feeding in bronchiolitis patients on HFNC is safe ($\leq 2\text{L/kg/min}$). ⁹
- Consider allowing patients to feed orally (or enterally) once they are stable on HFNC and showing interest in feeding. Home feeding regimen (breastmilk, formula, age-appropriate liquids) is appropriate. Add solids as desired once oral liquids are successfully tolerated.
- Initial feeding (breast, bottle, cup) should be monitored closely by parent and RN for any sign of aspiration.
- Consider an NG tube and enteral feeds for patients who are not taking PO. Enteral feeds mimic patient's typical home feeding regimen (breastmilk, formula, age-appropriate formula if >1 yo).

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