Intermountain Healthcare

INITIATION
(includes ED)

HIGH-FLOW NASAL CANNULA (HFNC) FOR NON-ICU USE

VIRAL LOWER AIRWAY INFECTION 0 – 36 MONTHS

If HFNC was started and patient requires inter-facility transfer, then the transfer must be to an ICU level of care.

This algorithm does not replace clinical judgment and is not intended to be prescriptive for all patients. If the clinical impression supports a decision different from the algorithm, then the RN, RT, and MD/LIP should discuss the decision together.

i = New changes this season

RT, RN, PHYSICIAN/LIP HUDDLE to consider HFNC if, despite interventions, patient meets ***any*** **INITIATION CRITERIA:**

- Bronchiolitis score* ≥ 7
- O_2 requirement > 2 L/min NC to keep SpO_2 ≥ 89%
- Grunting, nasal flaring, or head bobbing

And does NOT meet ***any*** **EXCLUSION CRITERIA** (see pg 2)

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INITIATE HFNC

- MD/LIP to evaluate patient promptly
- RT initiates HFNC at **Weight-based settings** (see pg 2)
- Continue feedings per **FEEDING GUIDELINES** (see pg 2)
- Follow **RT/RN ASSESSMENT TIMELINE** (see pg 2)
- Assessments over the next 1 hr *(see below)* will decide: escalation of care *vs.* non-ICU care

Reassess ***in 30 minutes***

After 30 min, does the patient have ***any*** signs of **RESPIRATORY FAILURE?**

- Apnea and/or bradycardia requiring intervention
- Requires positive-pressure ventilation
- SpO_2 < 89% on FiO_2 > 0.6
- PCO_2 > 60, if blood gas obtained
- Mental status changes

YES → CONSULT** or TRANSFER to ICU

NO → *Reassess* ***in 30 minutes***

Does the patient have ***any*** signs of **RESPIRATORY FAILURE** (see diamond above for signs) **or** persistent grunting or head bobbing?

YES → CONSULT** or TRANSFER to ICU

NO → MANAGE ON NON-ICU UNIT

NOT WORSENING

MANAGE ON NON-ICU UNIT

WEAN FiO_2 only, not changing the flow rate (weight-based).

- Titrate FiO_2 to keep SpO_2 89-94%
- Follow **RT/RN ASSESSMENT TIMELINE** (see pg 2)
- Continue feedings per **FEEDING GUIDELINES** (see pg 2)
- If in ICU, transfer patient out of ICU when meeting **STABLE CRITERIA for TRANSFER OUT OF ICU** (see pg 2)

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Does patient meet ***all*** **IMPROVED CRITERIA** for ≥ 4hrs?

- ❑ FiO_2 ≤ 0.3
- ❑ Bronchiolitis score* ≤ 5
- ❑ Resolution of grunting, nasal flaring, head bobbing

--or--

If not meeting ***all*** improved criteria, did MD/LIP request trial of 1-2 L/min 100% FiO_2 based on clinical impression?

NO → Does the patient have any signs of RESPIRATORY FAILURE or persistent grunting or head bobbing?

YES ↓

IMPROVED

Every 4 hours, decrease to 1 L/min at 100% FiO_2, still using the HFNC setup, for a 15 minute trial. Can adjust to 2 L/min at 100% FiO2 to maintain oxygenation.

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Does the patient meet ***all*** of the following during 15-min trial of 1-2 L/min at 100% FiO_2?

- ❑ Bronchiolitis score* ≤ 6
- ❑ Resolution of grunting, nasal flaring, head bobbing?
- ❑ SpO_2 ≥ 89%

NO (fail) → Return to previous HFNC settings

YES (pass) → Continue 1-2 L/min

i NEW: Allow up to 2 L/min during the trial period

Continue 1-2 L/min for *up to* 1 hr. Joint RT/RN assessment to consider removing HFNC and placing a standard NC at 1-2 L/min, titrating between 0 - 2 L/min as needed to maintain SpO_2 89-94%.

RT removes HFNC and places NC.

Joint RT/RN reassessment in 2 hrs

Meeting ***all*** of the following on NC at 0 - 2 L/min?

- ❑ Bronchiolitis score* ≤ 6
- ❑ Resolution of grunting, nasal flaring, head bobbing?
- ❑ SpO_2 ≥ 89%

NO → Return to previous HFNC settings

YES → RN contacts LIP for PED Bronchiolitis Admission Orders. Exit these guidelines.

Return to previous HFNC settings: **Weight-based HFNC flow rate** using the patient's FiO_2 from before the 1-2 L/min flow trial → MANAGE ON NON-ICU UNIT

WORSENING

CONSULT or TRANSFER to ICU**

- Attending to assess patient within 30 min of initiation
- If awaiting transfer and patient is clinically deteriorating, consider activating RRT

**for patients already at PCH, no ICU consult is available (only transfer).

→ MD/LIP manages patient in ICU until **all** **STABLE CRITERIA** are met (see pg 2). ICU may use these guidelines for trials of 1-2 L/min at 100% FiO_2

* Bronchiolitis score acceptable for use with patients 0-36 months with bronchiolitis / viral pneumonia

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Document questions: kristina.mckinley@hsc.utah.edu

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VIRAL LOWER AIRWAY INFECTION 0 – 36 MONTHS

(i) = Key changes this season

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HFNC EXCLUSION CRITERIA

Not eligible for *any* HFNC in non-ICU setting[#]

- > 36 months
- Primary diagnosis other than bronchiolitis or viral pneumonia
- Apnea and/or bradycardia requiring intervention
- Requires positive-pressure ventilation
- Co-morbid conditions per MD/LIP:
  - Air leaks / pneumothorax
  - Anatomic functional disorders of upper airway
  - Neuromuscular disease
  - Hemodynamically significant cardiac condition
  - Other significant co-morbidity that may require ventilatory support

Not eligible for HFNC *initiation* in non-ICU setting[#] After stabilization in the ICU, consider transfer to non-ICU unit when meets **STABLE CRITERIA** for age.

- Bacterial / atypical pneumonia
- Documented history of aspiration
- Chronic lung disease

*[#]Exceptions require approval of MOD (depending on location this is Medical Officer of the Day **or** Chief Medical Officer)*

Weight-based HFNC settings

Weight	Flow Rate (L/min)	FiO2
< 10 kg	Weight X 2 = flow rate	FiO_2 0.6 titrate to keep SpO_2 89-94%
≥ 10 kg	20 L /min	

Examples of calculated weight-based flow rates: 4.6 kg → 9 L/min. 7.9 kg → 16 L/min. 12 kg → 20 L/min.
If your HFNC setup (equipment/tubing) has a maximum flow rate that is lower than the settings in the table above, then your lower flow rate may be used.

RT/RN ASSESSMENT TIMELINE

Initiation or Worsening

- Every 30 minutes until stable, improving, or transferred to ICU

Stable

- Every hour x 3 hours, then every 2 hours
- Continue assessing every 2 hours after a failed 1-2 L/min trial

Improved

- Every 2 hours
- Evaluate at bedside during 15-minute trials of 1-2 L / min at 100% FiO_2

STABLE CRITERIA for TRANSFER OUT OF ICU

All of the following for at least **8 hours**:

- ❑ On standard NC ***--or--*** on HFNC with $FiO_2 \le 0.6$
- ❑ Bronchiolitis score* ≤ 6
  - ❑ ***exception***: *scores* ≥ 7 only during trials of 15-min 1-2 L / min at 100% FiO_2 do not exclude patient from transfer out of ICU*
- ❑ Absence of grunting, nasal flaring, and head bobbing
- ❑ Tolerating respiratory cares X 2 without deterioration

(i) NEW: no longer raising HOB unless specifically ordered

FEEDING GUIDELINES

- Applies to patients on standard NC or HFNC
- Discontinue IV fluid as soon as tolerated and provide all hydration and nutrition enterally.
- Oral feedings may continue while on HFNC.
- If NPO was ordered **or** if patient is not meeting the fluid goal orally, contact LIP within 6 hrs to initiate enteral feedings by ordering the PED Feeding Plan Viral Lower Respiratory Infection
- Oral or NG bolus feeds if meeting ***all*** of the following:
  - ❑ RR ≤ 65 for patient < 12 months or
  - ❑ RR ≤ 45 for patients 12 - 36 months
  - ❑ Bronchiolitis score* ≤ 6
  - Continuous NG feeds for ***any*** of the following, **unless** PO or bolus NG feedings approved by LIP
    - RR > 65 for patient < 12 months or
    - RR > 45 for patients 12 - 36 months
    - Bronchiolitis score* ≥ 7
    - If oral or bolus NG feeds not tolerated (for example, choking, gagging, coughing with feeds)
    - Concerns for aspiration
- For patients that do not tolerate continuous NG feeds, consider NJ placement
- To provide a safe sleep environment for infants less than 1 year of age with bronchiolitis, the head of bed (HOB) should be in the flat position with the infant supine for sleep to decrease the risk of Sudden Infant Death Syndrome. This positioning is supported by The North American Society for Pediatric Gastroenterology, Hepatology, and Nutrition for infants with reflux, and the American Society for Parenteral and Enteral Nutrition for infants with enteral nutrition in the interest of safe sleep. Individual patient need for HOB elevation due to respiratory status and/or potential risk of aspiration should be individually determined by the care team.

BRONCHIOLITIS CLINICAL SCORE*

Score	Respiratory Rate		Wheeze	Retractions
	< 1 year	≥ 1 year		
0	≤ 40	≤ 30	none	none
1	41-54	31-38	expiration	1 location
2	55-65	39-45	Inspiration and expiration	2 locations
3	> 65	> 45	Diminished breath sounds	3 or more locations

Key:
Respiratory Rate plus Wheezes plus Retractions equals Total Score
Normal - 0 to 1; **Mild** - 2 to 3; **Moderate** - 4 to 6; **Severe** - 7 to 9

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TRANSPORT GUIDANCE for HIGH-FLOW NASAL CANNULA (HFNC)

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Patients 0-36 months with bronchiolitis (viral lower airway infection) on HFNC who require interfacility transport

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- Transfer for these patients is to a PICU or to PCH ED.
- HFNC maximum flow rate for transport equipment is generally 15 L/min.
- However, maximum flow rate and transport equipment may vary by transport team.

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Referring provider calls receiving provider (at a PICU or PCH ED) to discuss mode/level of support for transport.

Consider:

- Clinical stability
- Current level of support
- Referring hospital capabilities
- Transport team arrival time
- Transport team equipment
- Transport duration
- Likelihood of deterioration during transport

Possible modes & levels to consider for transport. Consider changing to new mode prior to transport team arrival.

- HFNC up to 15L
- CPAP
- BiPAP
- Intubation & ventilation

Stable patients being transported on HFNC from an ED to PCH:

- Consider transfer to PCH ED instead of PCH PICU, as patient might go to non-ICU care once stabilized in PCH ED on HFNC

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