HIGH-FLOW NASAL CANNULA (HFNC) FOR NON-ICU VIRAL LOWER AIRWAY INFECTION 0 – 36 MONTHS

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HFNC CONSIDERATION

RT, RN, PHYSICIAN/APP HUDDLE for ***HFNC initiation pause*** (HIP):
- Optimize nasal suctioning (consider NP suction)
- Attempt feeds if safe for PO (vs. sucrose on pacifier)
- Encourage parent to hold the patient, dim the lights
- Administer an antipyretic for comfort if not already given
- Address hydration needs, consider bolus if clinically dehydrated
- Low-flow nasal cannula for saturation 88% or less

After 15-30 min
Despite interventions does the patient meet ***any*** INITIATION CRITERIA:
* Signs of severe respiratory distress or respiratory failure
* O_2 requirement > 2 L /min NC to keep $SpO_2 \geq 89\%$
And does NOT meet ***any*** **EXCLUSION CRITERIA** (see pg 2)

NO → Continue routine bronchiolitis care

YES

INITIATION

MD/DO/APP to evaluate patient promptly
RT initiates HFNC at Weight-based settings (see pg 2)
Feedings per FEEDING GUIDELINES (see pg 2 or pg 4)
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?** (see pg 2)

YES → Does the patient have ***any*** signs of **RESPIRATORY FAILURE?** (see pg 2)

NO

Reassess ***in 30 minutes***

Does the patient have ***any*** signs of **RESPIRATORY FAILURE?** (see pg 2)

YES → WORSENING

NO → NOT WORSENING

WORSENING

RT, RN, MD/DO/APP Huddle to determine TRANSFER to ICU
- Attending to assess patient if ICU transfer is favored
- If awaiting transfer and patient is clinically deteriorating, consider activating RRT

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

NOT WORSENING

MANAGE ON NON-ICU UNIT
Can consider discontinuing HFNC if no clear improvement in respiratory distress, no signs of respiratory failure, and child does not meet ICU criteria (determined by team huddle)
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 **CRITERIA for TRANSFER OUT OF ICU** (see pg 2)

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

Does patient meet ***all*** **IMPROVED CRITERIA** for ≥ 4hrs?
- ❑ $FiO_2 \leq 0.3$
- ❑ Bronchiolitis score* ≤ 5
- ❑ Resolution of grunting, nasal flaring, head bobbing

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

NO → 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

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.

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?
- ❑ $SpO_2 \geq 89\%$

YES (pass) → 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

Does patient meet ***all*** of the following on NC at 0 - 2 L /min?
- ❑ Bronchiolitis score* ≤ 6
- ❑ Resolution of grunting, nasal flaring, head bobbing?
- ❑ $SpO_2 \geq 89\%$

NO → 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

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

NO (fail) → 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

Intermountain Health

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HIGH-FLOW NASAL CANNULA (HFNC) FOR NON-ICU USE
VIRAL LOWER AIRWAY INFECTION 0 – 36 MONTHS

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HFNC EXCLUSION CRITERIA

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

- > 36 months of age
- Primary diagnosis other than bronchiolitis or viral pneumonia
- Apnea and/or bradycardia requiring intervention
- Co-morbid conditions per MD/DO/APP:
  - Air leaks / pneumothorax
  - Anatomic functional disorders of upper airway
  - Neuromuscular disease
  - Hemodynamically significant cardiac condition (i.e. cardiac disease requiring medications)
  - 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 **CRITERIA** for age.

- Bacterial / atypical pneumonia
- Documented history of aspiration
- Active chronic lung disease (i.e. on home O2)

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

Weight-based HFNC settings

Weight	Flow Rate (L/min)	FiO2
< 10 kg	Weight X 2 = flow rate	FiO_2 0.4 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

Not worsening

- 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

CRITERIA for TRANSFER OUT OF ICU

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

- ❑ On standard NC ***--or--*** on HFNC with $FiO_2 \leq 0.6$
- ❑ 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

SIGNS OF RESPIRATORY FAILURE

- Paradoxical breathing (chest caving in with inspiration)
- Altered mental status (i.e. child cannot be awakened)
- Auscultated air entry is minimal or absent
- $PCO_2 > 60$, if blood gas obtained
- $SpO_2 < 89\%$ on $FiO_2 > 0.6$

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, at the discretion of the medical team
- If NPO was ordered **or** if patient is not meeting the oral fluid goal, contact Physician/APP within 6 hrs to initiate enteral feedings by ordering the *"PED Feeding Plan Viral Lower Respiratory Infection"*
- Consider oral or NG bolus feeds if meeting the following:
  - ❑ RR ≤ 65 for patient < 12 months or
  - ❑ RR ≤ 45 for patients 12 - 36 months
  - ❑ Bronchiolitis score* ≤ 6
  - Consider continuous NG feeds for any of the following (**unless** PO or bolus NG feedings approved by provider):
    - RR > 65 for patient < 12 months or
    - RR > 45 for patients 12 - 36 months
    - Bronchiolitis score* ≥ 7
    - If oral or bolus NG feeds are not tolerated (for example, choking, gagging, coughing with feeds)
    - Concerns for aspiration
- For patients that do not tolerate continuous NG feeds, consider NJ placement
- The head of bed should be in the flat position unless individually determined by the care team to require elevation.

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

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

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TRANSPORT GUIDANCE for HIGH-FLOW NASAL CANNULA (HFNC)
VIRAL LOWER AIRWAY INFECTION 0 – 36 MONTHS

This guidance does not replace clinical judgment and is not intended to be prescriptive for all patients. If the clinical impression supports a decision different from this guidance, then the referring physician, accepting physician, and transport team should discuss the decision together.

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

- Patients on HFNC are eligible for direct admission to non-ICU care after two 30 minute assessments are performed.
- HFNC maximum flow rate for transport equipment is generally 15 L/min.
- However, maximum flow rate and transport equipment may vary by transport team.

Referring provider calls receiving provider (via direct admit line) 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

FEEDING GUIDELINES
VIRAL LOWER AIRWAY INFECTION 0 – 36 MONTHS

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If the clinical impression supports a decision different from the algorithm, then the RN, RT, and MD/DO/APP should discuss the decision together.

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, at the discretion of the medical team
- If NPO was ordered **or** if patient is not meeting the oral fluid goal, contact Physician/APP within 6 hrs to initiate enteral feedings by ordering the "*PED Feeding Plan Viral Lower Respiratory Infection*"
- Consider oral or NG bolus feeds if meeting the following:
  - ❑ RR ≤ 65 for patient < 12 months or
  - ❑ RR ≤ 45 for patients 12 - 36 months
  - ❑ Bronchiolitis score* ≤ 6
  - ○ Consider continuous NG feeds for any of the following (**unless** PO or bolus NG feedings approved by provider):
    - RR > 65 for patient < 12 months or
    - RR > 45 for patients 12 - 36 months
    - Bronchiolitis score* ≥ 7
    - If oral or bolus NG feeds are not tolerated (for example, choking, gagging, coughing with feeds)
    - Concerns for aspiration
- For patients that do not tolerate continuous NG feeds, consider NJ placement
- Individual patient need for HOB elevation due to respiratory status and/or potential risk of aspiration should be individually determined by the care team. General guidelines considering Intermountain Safe Sleep policy: 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.

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