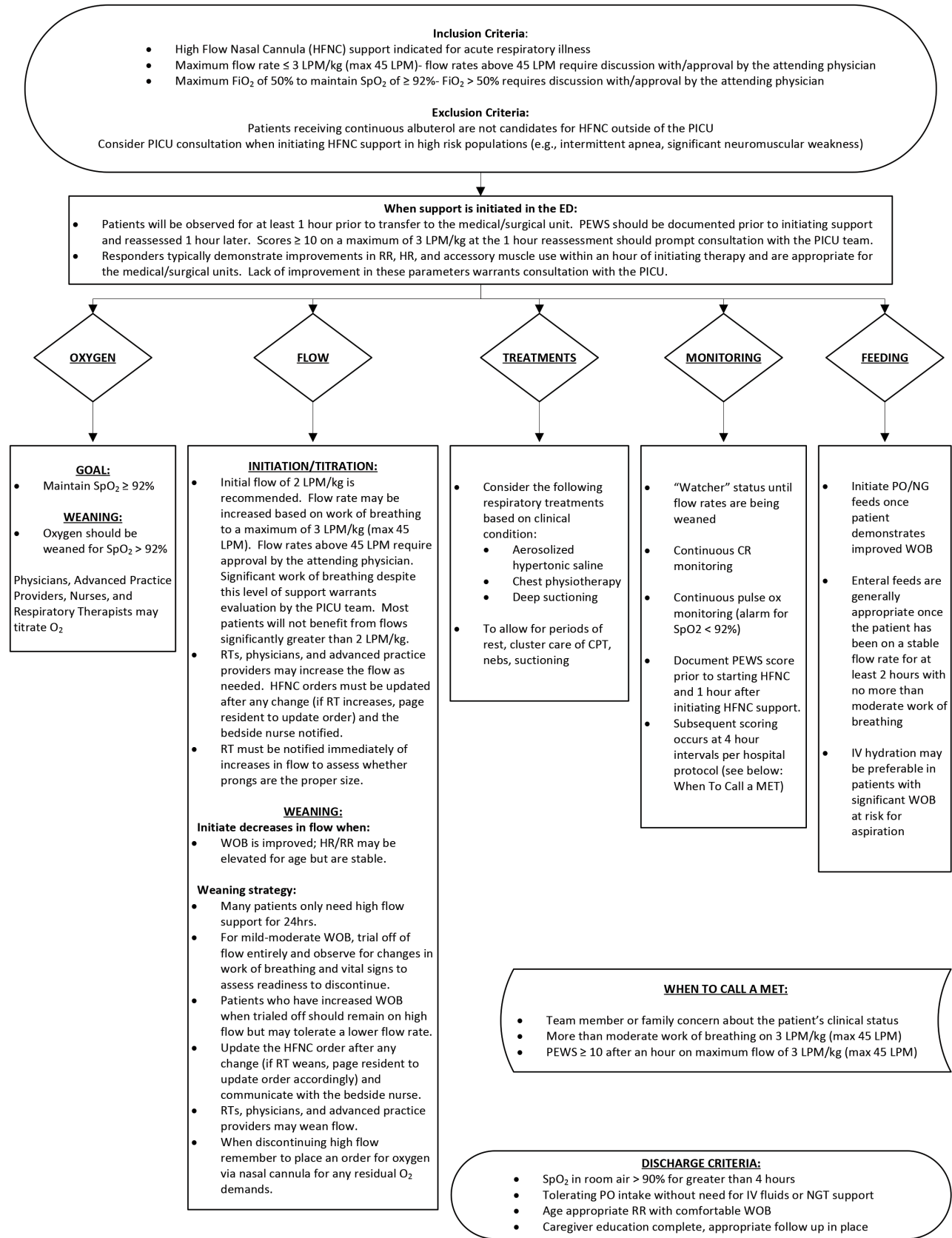


# CLINICAL PATHWAY: High Flow Nasal Cannula Use in Patients Outside of the Intensive Care Unit

THIS PATHWAY  
SERVES AS A GUIDE  
AND DOES NOT  
REPLACE CLINICAL  
JUDGMENT.



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CONTACTS: KATHY KALKBRENNER, MD | LISA LEBON, RRT

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## Practice Guideline

**High Flow Nasal Cannula Use in Patients Outside of the Pediatric Intensive Care Unit**

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I. Purpose

Create a standardized approach to providing heated high flow nasal cannula (HFNC) support to pediatric patients outside of the Pediatric Intensive Care Unit (PICU).

II. Background

High flow systems are designed to heat and humidify gas mixtures for safe delivery at flow rates that meet or exceed a patient's inspiratory flow demands, thereby decreasing work of breathing in the setting of respiratory illness. In addition to the benefits of avoiding more invasive modes of ventilatory support, HFNC therapy has the potential to decrease metabolic demands and facilitate safe enteral nutrition earlier in the disease course.

III. Inclusion Criteria

Patients who meet the following criteria may be appropriate candidates for HFNC therapy outside of the PICU setting:

- i. HFNC therapy prescribed for an acute respiratory illness
- ii. Support does not exceed 3 LPM/kg flow (max 45 LPM- flow rates above 45 LPM require discussion with/approval by the attending physician). Note: Most patients do not benefit from flow rates exceeding 2 LPM/kg.
- iii. Oxygen demand does not exceed 50% FiO<sub>2</sub> to maintain SpO<sub>2</sub> of 92% and above (FiO<sub>2</sub> above 50% requires discussion with/approval by the attending physician).

IV. Exclusion Criteria

Some patients receiving high flow support *may* be more appropriate for the ICU setting. For example, patients with intermittent apnea or significant neuromuscular weakness require a degree of vigilance that may not be possible outside of the ICU environment. When there is doubt or questions arise, consultation with the PICU team is advised.

Patients who require continuous albuterol are not candidates for HFNC outside of the PICU. Patients with asthma exacerbations receiving continuous albuterol administration and who demonstrate severe work of breathing should trigger a MET. If the MET team recommends HFNC the therapy may start on the medical/surgical unit with the expectation that the patient will transfer to the PICU. Several models demonstrate significantly decreased drug delivery of aerosols when HFNC is applied, hence these patients are best served by prioritizing albuterol delivery. If additional support is indicated then ICU level care is warranted.

V. Management Guidelines*a. Initiation/titration of support*

- i. Supplemental oxygen is the treatment for hypoxemia and therefore should be titrated to maintain a minimum SpO<sub>2</sub> of 92%. Patients with an oxygen demand that exceeds 50% FiO<sub>2</sub> require discussion with/approval by the attending physician.
- ii. Increased flow rates are the treatment for increased work of breathing. Initial flow rates of 2 LPM/kg are recommended. The flow rate may be increased as needed based on the patient's work of breathing to a maximum of 3 LPM/kg or 45 LPM, whichever is less. Flow rates above 45 LPM require discussion with/approval by the attending physician. Patients with significant work of breathing despite this level of support warrant evaluation by the PICU team. Respiratory Therapy must be notified immediately any time flow rates are increased to ensure that the patient is fitted with the appropriate sized nasal

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cannula to support the desired flow. Patients who respond well to HFNC support typically demonstrate improvements in respiratory rate, heart rate, and accessory muscle use within an hour of initiating therapy. Lack of improvement in these parameters despite support with flow rates of 3 LPM/kg (max 45 LPM) signals the need for more support with CPAP/BiPAP or mechanical ventilation. Most patients will not benefit from flow rates in excess of 2 LPM/kg.

- iii. When support is initiated in the ED, patients will be observed for at least an hour to evaluate the response to therapy and determine whether disposition to the medical/surgical units v. PICU is appropriate. The PEWS score should be documented prior to initiating support and reassessed 1 hour later. PEWS of 10 or more on a maximum of 3 LPM/kg (max 45 LPM) at the 1 hour reassessment should prompt consultation with the PICU team.

**b. Feeding**

- i. Oral/NGT feeds may be initiated once improvements have been demonstrated in work of breathing with a stable level of support. Avoidance of enteral feeding is advised when initiating HFNC support until there is sufficient confidence that positive pressure ventilation will not be necessary. This is in order to avoid the aspiration risks associated with initiating CPAP/BiPAP or endotracheal intubation in a patient with a full stomach. Enteral feeds are generally appropriate once the patient has been on a stable flow rate for at least 2 hours with mild to moderate work of breathing.

**c. Weaning support**

- i. Supplemental oxygen should be weaned to the lowest FiO<sub>2</sub> needed to maintain SpO<sub>2</sub> of 92%. Physicians, advanced practice providers, nurses, and respiratory therapists may titrate FiO<sub>2</sub>.
- ii. Once the patient's work of breathing has improved and HR/RR have stabilized, flow may be decreased. Many patients will only require HFNC support for 12-24 hours, and the best way to determine ongoing need is to assess changes in vital signs and work of breathing in response to a decrease/discontinuation of flow. A suggested approach for patients with mild-moderate work of breathing is to trial the patient off of flow entirely and observe for changes in work of breathing and vital signs; the need for ongoing support is generally clear after only a few minutes of monitoring. Orders should be updated and if discontinuing high flow an order for supplemental oxygen via nasal cannula should be placed for any residual oxygen demand. Respiratory therapists, physicians, and advanced practice providers may perform these bedside weans.

**d. Monitoring**

- i. Patients receiving HFNC therapy will have "Watcher" status until their condition stabilizes and flow rate is being actively weaned.
- ii. Patients receiving HFNC therapy mandate continuous pulse oximetry and full cardiorespiratory monitoring.
- iii. Patients will frequently have a PEWS score of 7 or more because all HFNC patients are on more than 4 LPM of support and therefore automatically start with a minimum of 4 points assigned. The PEWS score should be documented just before starting HFNC support and reassessed one hour later. Scores of 10 or more on a maximum of 3 LPM/kg (max 45 LPM) after the one hour reassessment should prompt a MET activation. Subsequent PEWS scores should be obtained at 4 hour intervals per hospital policy.
- iv. MET activations are indicated for: any concern that a patient is experiencing a decline in cardiorespiratory or neurological status; more than moderate work of



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breathing on 3 LPM/kg (max 45 LPM); PEWS of 10 or more after an hour on maximum support of 3 LPM/kg (max 45 LPM).

e. *Deep suctioning technique*

Nasotracheal suctioning is necessary when a patient is unable to effectively mobilize pulmonary secretions and does not have an artificial airway.

- i. Open suction kit or catheter using aseptic technique. Do not allow the suction catheter to touch nonsterile surfaces.
- ii. Secure catheter to tubing aseptically. Coat distal 2-3 inches of catheter with water-soluble lubricant (K-Y Jelly/Lubricant).
- iii. Without applying suction and using the dominant thumb and forefinger, gently, but quickly insert the sterile catheter into either naris during inhalation with a slight downward slant. Do not force the catheter. Try the other naris if insertion meets resistance or is difficult to insert. Estimate depth of insertion based on the distance from the patient's nose to the base of the earlobe and then down to the thyroid cartilage as a guide. Remember that the epiglottis is open during inspiration and facilitates insertion of the catheter into the trachea.
- iv. Apply intermittent suction by placing and releasing non-dominant thumb over the vent of catheter. Slowly withdraw the catheter while rotating it in a circular motion with suction on for as long as 10-15 seconds.
- v. Assess the need to repeat suctioning procedure. Allow adequate time between suction passes for ventilation and oxygenation. Keep oxygen readily available in case the patient exhibits signs of hypoxemia. Administer oxygen to the patient between suctioning attempts.
- vi. When the pharynx and trachea are cleared of secretions, perform oral suctioning to clear the mouth of secretions. Do not suction the nose or trachea after suctioning the mouth.
- vii. Deep suctioning may cause trauma and/or edema to the mucosa. Discontinue deep suctioning if bleeding occurs until discussed with the physician/practitioner.

VI. Key References

1. Venanzi A, Di Filippo P, Santagata C, Di Pillo S, Chiarelli F, Attanasi M. Heated Humidified High-Flow Nasal Cannula in Children: State of the Art. *Biomedicines*. 2022 Sep 21;10(10):2353. doi: 10.3390/biomedicines10102353. PMID: 36289610; PMCID: PMC9598483.
2. Nolasco S, Manti S, Leonardi S, Vancheri C, Spicuzza L. High-Flow Nasal Cannula Oxygen Therapy: Physiological Mechanisms and Clinical Applications in Children. *Front Med (Lausanne)*. 2022 Jun 3;9:920549. doi: 10.3389/fmed.2022.920549. PMID: 35721052; PMCID: PMC9203852.



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