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

**Inclusion Criteria:**
Receiving High Flow Nasal Cannula (HFNC) therapy for acute respiratory illness, requiring < 3 LPM/kg flow, max of 50% FiO2 to maintain SpO2 of ≥92%; tolerating weaning of flow rates or stable on max support for at least 6 hours

**Exclusion Criteria:**
None

If all inclusion criteria met, may be appropriate for transfer from PICU to MS floors

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**OXYGEN**
- **GOAL:** Maintain minimum SpO2 of 92%
- **WEANING:** Should be weaned first before flow changes; can wean flow once at 40% FiO2
- **ANYONE CAN WEAN**

**FLOW**
- **WEANING:** Flow rate changes must be ordered by provider and may only be completed by RT.
- Can initiate when:
  - Able to maintain SpO2 of 92% with no more than 40% FiO2 AND WOB improved; HR/RR may be elevated but are stable
- Wean by:
  - Decrease flow by 2 LPM q4hr as tolerated; may wean faster if condition allows
  - If HR/RR/WOB stable at 4LPM: transition to conventional nasal cannula (1-2 LPM)
  - Wean NC as tolerated based on WOB and SpO2

**TREATMENTS**
- Continue current respiratory treatments until decreases in flow are tolerated and secretions are well controlled.
- These may include:
  - Aerosolized hypertonic saline
  - CPT
  - Deep suctioning
- Recommend cluster care of CPT, Nebs, suctioning and feeds for periods of rest

**MONITORING**
- Watcher” status until HFNC successfully discontinued for 24 hours
- Continuous CR monitoring
- Continuous pulse ox monitoring (alarm for SpO2 <92%)
- Document PEWS at time of transfer (may be ≥7 or > at that time due to flow rates)
- Initiate/continue PO if improved WOB/02 demand on stable settings
- *Recommend cluster care with respiratory treatments

**FEEDING**
- Continue current respiratory treatments until decreases in flow are tolerated and secretions are well controlled.

**WHEN TO CALL A MET:**
- **Any increase of PEWS** from score at time of transfer from PICU
- **Staff and/or family concern for decline in clinical status**
- **Oxygen demands exceed 50% FiO2**
- **Any significant increase in support after transfer to MS floor**
- **Any decline in respiratory status that requires restarting HFNC after a 12 hour period of stability on standard nasal cannula or room air** (if respiratory distress shortly after HFNC discontinuation requires resuming support at low flow rates, this does not necessarily warrant a MET)

**DISCHARGE CRITERIA:**
- SpO2 on RA ≥ 90% for greater than 4 hrs (and for infants, must maintain saats through a feed)
- Tolerating PO without any need for IVF
- Age appropriate RR with easy WOB
- Caregiver education complete
- Responsible and capable caregivers to care as outpatient
- POP identified and follow up appointment made

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I. **Purpose:** To provide a standardized approach to providing continued heated high flow nasal cannula (HFNC) support for pediatric patients who are transferring out of the Pediatric Intensive Care Unit (PICU).

II. **Background:** High flow systems are designed to heat and humidify gas mixtures that can be safely delivered 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:**
   - Inclusion Criteria: Patients who meet all of the following criteria may be appropriate candidates for HFNC therapy upon transfer outside of the PICU setting:
     1. Patients receiving HFNC therapy for an acute respiratory illness
     2. Support not to exceed 3LPM/kg flow
     3. Maximum of 50% FiO2 to maintain SpO2 of 92% and above
     4. Tolerating weaning of flow rates or stable on current support for a period of at least 6 hours

IV. **Guidelines:** Patients will be candidates for transfer from the PICU once they satisfy all the inclusion criteria outlined above
   - **Titration of support**
     1. Supplemental oxygen should be titrated to maintain a minimum SpO2 of 92%. Patients who develop an oxygen demand that exceeds 50% FiO2 require re-consultation with the PICU team or MET activation.
     2. Flow may be increased (typically in increments of 2LPM) as needed based on the patient’s work of breathing to a maximum of whatever flow the patient was receiving at the time of PICU transfer. Patients are selected for transfer with the expectation that they are stable/recovering, therefore any significant increase in support following transfer should prompt re-consultation with the PICU or a MET activation.
     3. Once HFNC therapy has been discontinued and the patient has been clinically stable for a 12-hour period, any decline in respiratory status should prompt discussion with the primary team and consideration of a PICU consult or MET activation. This recommendation is intended to prevent “new” initiation of HFNC support in the Medical/Surgical setting. Patients with respiratory distress shortly after stopping HFNC therapy who need to resume support at low flow rates do not necessarily warrant PICU consultation or MET activation.
     4. In some cases, aerosolized hypertonic saline, chest physiotherapy and deep (nasotracheal) suctioning are key components of the treatment plan for patients receiving this level of support, and should be continued until significant decreases in flow are tolerated and secretions are well controlled. A practice of “clustered care” is suggested in these cases, where chest physiotherapy and suctioning is performed and then followed
by feeding, to allow for periods of rest for the patient between episodes of hands on care.

b. 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 any nonsterile surfaces.
   ii. Secure catheter to tubing aseptically. Coat distal 2-3 inches of catheter with water-soluble lubricant (K-Y Jelly/Lubricant).
   iii. Remove oxygen delivery device with non-dominant hand. 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.

c. Feeding
   i. Oral feeds may be initiated/continued once improvements have been demonstrated in WOB/oxygen demand on stable settings.

d. Weaning support
   i. Supplemental oxygen should be weaned first; once the patient is able to maintain SpO2 of 92% with no more than 40% FiO2, decreases in flow rate can proceed.
   ii. Once the patient’s work of breathing has improved and HR/RR have stabilized, flow may be decreased; decreases of 2LPM every 4 hours as tolerated are suggested; faster weaning may be appropriate based on the patient’s exam and will be at the discretion of the physician or advanced practitioner.
   iii. Once flow has been reduced to 4LPM and clinical parameters (HR, RR, WOB) are stable, transition to conventional nasal cannula (1-2LPM) may occur.
   iv. All health care providers may actively wean FiO2.
v. Changes in patient’s liter flow rate should be implemented exclusively by the Respiratory Therapy provider after being ordered by a physician or advanced practitioner.

e. Monitoring

i. Patients transferred out of the PICU on HFNC therapy will retain “Watcher” status for 24 hours after HFNC therapy is discontinued.

ii. Patients receiving HFNC therapy mandate continuous pulse oximetry and full cardiorespiratory monitoring.

iii. Patients will frequently have a PEWS score of 7 or greater at the time of transfer from the PICU. PEWS at the time of transfer should be documented, and any increase should prompt a MET activation. In addition, any concern on the part of staff or a family member that a patient is experiencing a decline in cardiorespiratory or neurological status is an indication for MET activation.

V. References

6. Ward JJ. High-flow oxygen administration by nasal cannula for adult and perinatal patients. Respiratory Care 2013; 58:98-120