TEXAS CHILDREN’S HOSPITAL
EVIDENCE-BASED OUTCOMES CENTER
High Flow Nasal Cannula (HFNC) Therapy: Initiation and Escalation for Respiratory Distress
Evidence-Informed Pathway

**Target Group**
- Late VLBW Bronchiolitis Guideline
- Consider for other age groups and disease entities, such as asthma and CAP

**Assess**

<table>
<thead>
<tr>
<th>CRS</th>
<th>Respiratory Age</th>
<th>Auscultation</th>
<th>Use of Accessory Muscles</th>
<th>Mental Status</th>
<th>Skin for Age</th>
<th>Color</th>
</tr>
</thead>
<tbody>
<tr>
<td>CRS 0-6</td>
<td>&lt; 2 yrs or &lt; 10 lbs</td>
<td>Good air movement, scaphoid epigastrium, shallow, loose abdominal musculature</td>
<td>No use of accessory muscles, mild to no retractions, no nasal flaring on inspiration</td>
<td>Normal or mild irritability</td>
<td>Normal</td>
<td>Normal/Pale</td>
</tr>
</tbody>
</table>

**OFF algorithm**
- Manage as appropriate to clinical findings

**Patient presents with developing/worsening respiratory distress**

**RN/RT** to:
- Assess the patient
- Notify responsible provider(s) (attending/fellow/resident/APP)
- Perform nasopharyngeal suctioning
- RN notifies RT or vice versa
- Obtain and document CRS (RT) and a full set of vitals (RN) in Epic

**MD/RN/RT** to consider:
- Beta-agonist or vaponephrine treatment, as appropriate for diagnosis
- Placing on NPO status
- Treating pain and/or fever

**Yes**

**No**

**CRS ≥7**

**RT & RN** to reassess within 30 min. of respiratory interventions and document CRS (RT) and vitals (RN) in Epic

**RN/RT** to:
- Contact physician
- Perform nasopharyngeal suctioning
- Document CRS (RT) and vital signs (RN)

**MD** to reassess patient

**ACUTE CARE**
- For CRS 7
  - Proceed down algorithm
- For CRS 8
  - Activate RRT for potential escalation to CPAP, BiPAP or intubation and/or potential transfer to PCU or ICU
  - Proceed down algorithm

**EC/PCU/PICU**
- Consider initiation/escalation to CPAP, BiPAP or intubation
- Disposition based on respective guideline admission criteria and/or specific intervention utilized

**Patient already on HFNC**

**No**

**Yes**

**MD** to place order for HFNC (order should not delay initiation, especially in patients with CRS ≥8)
- RT to initiate HFNC at starting flow for cannula (see table)
- RT to adjust FiO2 to maintain O2 saturation ≥90%

**Patient clinical status stable or improving**

**NO**

**Yes**

**Patient disposition should NOT be based on HFNC settings (i.e., FiO2, flow). Patient disposition should be determined by the overall clinical condition, which is mainly defined by CRS. See next page for additional guidance.**
The following are general admission/exclusion criteria for acute care areas and are not exclusive to this protocol. These are provided to assist and offer general guidance on patient disposition and are not meant to be all-inclusive. Patient needs and status will ultimately determine disposition and will be based on discussion amongst the multidisciplinary providers (i.e., RT, physician, nurse).

| **MC Acute Care** | Inclusion:  
<table>
<thead>
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<tbody>
<tr>
<td></td>
<td>- CRS 0-5 at time of disposition and/or transfer, if stable or improving on allowable max. therapies</td>
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<tr>
<td><strong>Exclusion:</strong></td>
<td>- Patient is not stable or improving on allowable max. therapies</td>
</tr>
<tr>
<td></td>
<td>- Patient requiring continuous albuterol therapy</td>
</tr>
<tr>
<td></td>
<td>- CPAP or BiPAP use for patients with acute respiratory disease</td>
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</tbody>
</table>

| **MC Respiratory Unit (Abercrombie 6N)** | Inclusion:  
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<tbody>
<tr>
<td></td>
<td>- Patient requiring continuous albuterol therapy</td>
</tr>
<tr>
<td></td>
<td>- CRS &lt;8 at time of disposition and/or transfer, if stable or improving on allowable max. therapies</td>
</tr>
<tr>
<td><strong>Exclusion:</strong></td>
<td>- CPAP or BiPAP use for patients with acute respiratory disease</td>
</tr>
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<td></td>
<td>- Need for additional magnesium doses or terbutaline infusion</td>
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| **WC Acute Care** | Inclusion:  
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<tr>
<td></td>
<td>- CPAP or BiPAP use for patients with acute or chronic respiratory disease</td>
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</table>
Critical Points of Evidence

Evidence Supports

- Use HFNC therapy in children experiencing respiratory distress. Use the maximum flow rate for the patient’s appropriate cannula size. (11-12) – Strong recommendation, low quality evidence
- Identify nonresponders as patients exhibiting no response (e.g., HR, RR) within 1 hour of therapy. (13-16) – Strong recommendation, low quality evidence

The clinical respiratory score (CRS) used at TCH includes respiratory rate, among other markers. Patients with a significant cardiopulmonary disorder may have a higher HFNC therapy failure rate than the general population.

Evidence Lacking/Inconclusive

- Utilize the oxygen weaning protocol for HFNC therapy weaning. – Consensus recommendation
References

Clinical Standards Preparation
This clinical standard was prepared by the Evidence-Based Outcomes Center (EBOC) team in collaboration with content experts at Texas Children’s Hospital. Development of this clinical standard supports the TCH Quality and Patient Safety Program initiative to promote clinical standards and outcomes that build a culture of quality and safety within the organization.

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Kathy Carberry, MPH, RN, Director

Development Process
This clinical standard was developed using the process outlined in the EBOC Manual. The literature appraisal documents the following steps:
1. Review Preparation
   - PICO questions established
   - Evidence search confirmed with content experts
2. Review of Existing Internal and External Guidelines
   - N/A
3. Literature Review of Relevant Evidence
   - Searched: Cochrane, PubMed, Google
4. Critically Analyze the Evidence
   - 1 randomized controlled trial and 14 nonrandomized studies
5. Summarize the Evidence
   - Materials used in the development of the clinical standard, literature appraisal, and any order sets are maintained in a HFNC Therapy evidence-based review manual within EBOC.

Evaluating the Quality of the Evidence
Published clinical guidelines were evaluated for this review using the AGREE II criteria. The summary of these guidelines are included in the literature appraisal. AGREE II criteria evaluate the quality of the evidence.

Recommendation

- **Strong** Desired effects clearly outweigh undesirable effects or vice versa
- **Weak** Desirable effects closely balanced with undesirable effects

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<th>Quality</th>
<th>Type of Evidence</th>
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<tr>
<td>High</td>
<td>Consistent evidence from well-performed RCTs or exceptionally strong evidence from unbiased observational studies</td>
</tr>
<tr>
<td>Moderate</td>
<td>Evidence from RCTs with important limitations (e.g., inconsistent results, methodological flaws, indirect evidence, or imprecise results) or unusually strong evidence from unbiased observational studies</td>
</tr>
<tr>
<td>Low</td>
<td>Evidence for at least 1 critical outcome from observational studies, RCTs with serious flaws or indirect evidence</td>
</tr>
<tr>
<td>Very Low</td>
<td>Evidence for at least 1 critical outcome from unsystematic clinical observations or very indirect evidence</td>
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Recommendations
Practice recommendations were directed by the existing evidence and consensus amongst the content experts. Patient and family preferences were included when possible. The Content Expert Team and EBOC team remain aware of the controversies in the initiation and escalation of HFNC therapy in children. When evidence is lacking, options in care are provided in the clinical standard and the accompanying order sets (if applicable).

Approval Process
Clinical standards are reviewed and approved by hospital committees as deemed appropriate for its intended use. Clinical standards are reviewed as necessary within EBOC at Texas Children’s Hospital. Content Expert Teams are involved with every review and update.

Disclaimer
Practice recommendations are based upon the evidence available at the time the clinical standard was developed. Clinical standards (guidelines, summaries, or pathways) do not set out the standard of care and are not intended to be used to dictate a course of care. Each physician/practitioner must use his or her independent judgment in the management of any specific patient and is responsible, in consultation with the patient and/or the patient’s family, to make the ultimate judgment regarding care.
### Version History

<table>
<thead>
<tr>
<th>Date</th>
<th>Action</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sep 2016</td>
<td>Originally completed</td>
<td></td>
</tr>
<tr>
<td>Jan 2018</td>
<td>Revised</td>
<td>Changed CRS cutoff for HFNC therapy; removed hypertonic saline</td>
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