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Respiratory Emergencies In Birth to Year 2: The Dreaded Flu Season
Introductions

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Disclosures

- I *do not* have any relationships with commercial interests to disclose.

- I *do not* intend to reference unlabeled or unapproved uses of drugs or products in my presentation.
Objectives

- To understand pediatric anatomic and physiologic factors relevant to pediatric airways
- To describe the treatment of pediatric respiratory disease.
Classic signs of respiratory distress

- Increased respiratory rate
- Nasal flaring
- Tracheal tugging
- Head bobbing
- Retractions (several types)
Adult Vs. Pediatric

Diagram showing the difference between adult and pediatric structures, labeled as 'Thyroid cartilage' and 'Cricoid'.
Airway Shape

Figure 2: Peds vs. Adult Airway: Effect of 1mm circumferential edema
Anatomy of the epiglottitis

- Location
- Angle
- Shape
- Floppy
Baseline respiratory values

- Premature: 40-70 bpm
- 0-3 months: 35-55 bpm
- 3-6 months: 30-45 bpm
- 6-12 months: 25-40 bpm
Resources Available

- Children’s Hospital of Philadelphia Clinical Pathway:
  - www.chop.edu/pathways
Clinical Pathways Program

Our Clinical Pathways Program within the Office of Clinical Quality Improvement aims to incorporate evidence, best practice, and local expert consensus into easily accessible, shared mental models for use by clinical teams at the point of care to facilitate the delivery of high quality medical care.

Learn more about the Clinical Pathways Program at CHOP

FIND A CLINICAL PATHWAY

Condition, injury, symptom or specialty

Search

VIEW ALL CLINICAL PATHWAYS
FIND A CLINICAL PATHWAY

Condition, injury, symptom or specialty

Search

FILTER BY TYPE

All  Emergency  ICU  Inpatient  Outpatient Specialty Care
Primary Care  New  Updated
ED Pathway for the Evaluation/Treatment of the Child with Croup

**Related Pathways:**
Inpatient Croup Pathway

**Goals and Metrics**

**Child with Croup**

**Triage**
- Signs of Respiratory Failure
- Resuscitation Room
- Difficult/Critical Airway Pathway

**History and Physical**

**MILD**
- Any of the following:
  - Barking cough, hoarse voice
  - No stridor at rest
  - Mild coarse stridor
  - Stridor only during agitation/activity
  - No or mild WOB

**MODERATE/SEVERE**
- Any of the following:
  - Anxiety, mental status changes
  - Stridor at rest
  - Moderate, severe WOB
  - Hypoxemia

Learn More

**Evidence**
- An update highlighting the effectiveness of 0.15 mg/kg of dexamethasone
- Comparison between single-dose oral prednisolone and oral dexamethasone for the treatment of croup: A randomized, double-blind clinical trial
- A randomized comparison of dexamethasone 0.15 mg/kg versus 0.6 mg/kg for the treatment of moderate to severe croup
- Efficacy of a small single dose of oral dexamethasone for outpatient croup: a double-blind placebo-controlled clinical trial
Bronchiolitis

- Supportive Care!
- Suction, Suction, Suction
- Hydration, Nutrition
- Fever Management
Bronchiolitis Treatment Pathway

**Mild**
- Consider Suction-bulb

**Moderate**
- Suction: Bulb
  - Bronchodilators not recommended for typical bronchiolitis. If used, document reason and response.

**Severe**
- Suction: Bulb or wall
  - Bronchodilators not recommended for typical bronchiolitis. If used, document reason and response.

If no improvement after suctioning, assess with attending at bedside to discuss additional treatment including initiating HFNC oxygen - [View Job Aid](#)
Admission versus Discharge

- **Discharge Criteria:**
  - Oxygen saturation >90% awake
  - Adequate oral intake
  - Mild/moderate work of breathing
  - Reliable caregiver
  - Able to obtain follow up

- **Admission:**
  - Repeated assessment
  - Response
  - Stage of illness

- **If not met:**
  - Inpatient: requires O2
  - ED/Obs: mild disease with expected LOS <24 hours
  - ICU: Apnea, severe distress, requires Non-invasive
# High Flow Nasal Canula

## Bronchiolitis Pathway ONLY

<table>
<thead>
<tr>
<th>Age</th>
<th>Flow [lpm]</th>
<th>FiO₂</th>
<th>Location</th>
<th>Monitoring Minimum</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 3m</td>
<td>2-4</td>
<td>&lt; 40%</td>
<td>Floor</td>
<td>Pulse oximeter, CR Monitor, q1 hour vitals</td>
</tr>
<tr>
<td></td>
<td>&gt; 4</td>
<td>&gt; 40%</td>
<td>ICU*</td>
<td>Central monitoring, q1 hour vitals</td>
</tr>
<tr>
<td>3m - 12m</td>
<td>4 - 8</td>
<td>&lt; 40%</td>
<td>Floor</td>
<td>Pulse oximeter, CR Monitor, q1 hour vitals Initiate at 6-8 lpm after suctioning and wean rate as tolerated. If continued increased work of breathing at 8 lpm, consult ICU or call <a href="#">CAT team</a></td>
</tr>
<tr>
<td></td>
<td>&gt; 8</td>
<td>&gt; 40%</td>
<td>ICU*</td>
<td>Central monitoring, q1 hour vitals</td>
</tr>
<tr>
<td>12m - 2 yr</td>
<td>4- 10</td>
<td>&lt; 40%</td>
<td>Floor</td>
<td>Pulse oximeter, CR Monitor, q1 hour vitals Initiate at 6-8 lpm after suctioning and wean rate as tolerated. If continued increased work of breathing at 10 lpm, consult ICU or call <a href="#">CAT team</a></td>
</tr>
<tr>
<td></td>
<td>&gt; 10</td>
<td>&gt; 40%</td>
<td>ICU*</td>
<td>Central monitoring, q1 hour vitals</td>
</tr>
</tbody>
</table>

*Should evaluate patient’s need for noninvasive or invasive mechanical ventilatory support (e.g., with blood gas, X-ray, etc)
## Job Aid: Guidelines for Initiation of High Flow Nasal Cannula Outside the ICU

<table>
<thead>
<tr>
<th>Age</th>
<th>Flow [lpm]</th>
<th>FiO₂</th>
<th>Location</th>
<th>Monitoring Minimum</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 3m</td>
<td>2 - 3</td>
<td>&lt; 40%</td>
<td>Floor</td>
<td>Pulse oximeter, CR Monitor, q1 hour vitals</td>
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<tr>
<td></td>
<td>&gt; 3</td>
<td>&gt; 40%</td>
<td>ICU*</td>
<td>Central monitoring, q1 hour vitals</td>
</tr>
<tr>
<td>3m – 12m</td>
<td>2 – 4</td>
<td>&lt; 40%</td>
<td>Floor</td>
<td>Pulse oximeter, CR Monitor, q1 hour vitals</td>
</tr>
<tr>
<td></td>
<td>&gt; 4</td>
<td>&gt; 40%</td>
<td>ICU*</td>
<td>Central monitoring, q1 hour vitals</td>
</tr>
<tr>
<td>12m – 2yr</td>
<td>3 - 5</td>
<td>&lt; 40%</td>
<td>Floor</td>
<td>Pulse oximeter, CR Monitor, q2 hour vitals</td>
</tr>
<tr>
<td></td>
<td>&gt; 5</td>
<td>&gt; 40%</td>
<td>ICU*</td>
<td>Central monitoring, q1 hour vitals</td>
</tr>
<tr>
<td>2yr – 6yr</td>
<td>4 - 6</td>
<td>&lt; 40%</td>
<td>Floor</td>
<td>Pulse oximeter, CR Monitor, q2 hour vitals</td>
</tr>
<tr>
<td></td>
<td>&gt; 6</td>
<td>&gt; 40%</td>
<td>ICU*</td>
<td>Central monitoring, q1 hour vitals</td>
</tr>
<tr>
<td>&gt; 6yr</td>
<td>6 - 10</td>
<td>&lt; 40%</td>
<td>Floor</td>
<td>Pulse oximeter, CR Monitor, q2 hour vitals</td>
</tr>
<tr>
<td></td>
<td>&gt; 10</td>
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<td>ICU*</td>
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*Should evaluate patient’s need for noninvasive or invasive mechanical ventilatory support (e.g., with blood gas, X-ray, etc)
Pediatrics
November 2014, VOLUME 134 / ISSUE 5
From the American Academy of Pediatrics
Clinical Practice Guideline

Clinical Practice Guideline: The Diagnosis, Management, and Prevention of Bronchiolitis

Croup

MILD

- Any of the following:
  - Barky cough, hoarse voice
  - No stridor at rest
  - Mild coarse stridor
  - Stridor only during agitation/activity
  - No or mild WOB

- Dexamethasone
  - All patients

Discharge Criteria

MODERATE/SEVERE

- Any of the following:
  - Anxiety, mental status changes
  - Stridor at rest
  - Moderate, severe WOB
  - Hypoxemia

- Dexamethasone
  - Racemic Epinephrine

Improved

Observe for 2 hours
After 2 hours observation

Continued or Recurrent Stridor

Racemic Epinephrine

Improved
Admit to EDECU/General Pediatrics

Not improved
Admit to PICU
Consider Alternative Diagnoses Further Diagnostic Testing
Croup Treatment Considerations

**TREATMENT CONSIDERATIONS**
Dexamethasone: 0.3 mg/kg, MAX 8 mg
Racemic Epinephrine: 2.25% solution, 0.5 mL in 3 mL NS

**CONSIDER ALTERNATIVE DIAGNOSES**
- Age < 6 months, or > 6 years
- Poor response to treatment
- Duration of stridor > 4 days or cough > 10 days
- Non-elective intubation in past 6 months
- Prolonged intubation
- Recurrent croup
  - 2nd episode within 30 days
  - > 3 episodes in the last 12 months
- Toxic appearance
- Drooling, difficulty swallowing, severe anxiety
- Asymmetry of the respiratory exam

**FURTHER DIAGNOSTIC TESTING**
# Further Testing

<table>
<thead>
<tr>
<th>Test</th>
<th>Recommendation</th>
<th>Consider if</th>
</tr>
</thead>
<tbody>
<tr>
<td>Airway X-ray and/or Chest X-ray</td>
<td>Not routinely recommended</td>
<td>Suspected foreign body – esophageal or airway</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Deviation from expected clinical course</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Severe disease, toxic appearance</td>
</tr>
<tr>
<td>Viral RRP</td>
<td>Viral testing is not routinely recommended</td>
<td>Diagnosis is in question</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Prolonged fever</td>
</tr>
<tr>
<td>Pertussis PCR</td>
<td>Pertussis Testing is not routinely recommended</td>
<td>History of apnea and prolonged cough</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Known exposure</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Unimmunized or only partially immunized</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Significant pertussis activity in the community</td>
</tr>
<tr>
<td>ENT Consultation</td>
<td>Consultation is not routinely recommended in the ED</td>
<td>Consider outpatient follow up with ENT if resolution of symptoms and</td>
</tr>
<tr>
<td></td>
<td></td>
<td>History of non-effective intubation in past 6 months</td>
</tr>
<tr>
<td></td>
<td></td>
<td>History of prolonged intubation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Recurrent croup</td>
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<td></td>
<td></td>
<td>2nd episode within 30 days</td>
</tr>
<tr>
<td></td>
<td></td>
<td>&gt; 3 episodes in the last 12 months</td>
</tr>
</tbody>
</table>
Influenza

- In young children respiratory illness does not necessarily have a respiratory presentation
- 30% of infants who influenza do not present for respiratory symptoms
- Fever is most common presentation complaint
Tamilflu/Oseltamivir

- If patient requires admission: Rapid Flu A/B test recommended.
- If patient doesn’t need admission, consider rapid test for anyone who is not previously healthy and under 24 months of age.
- Most likely to be effective within 48 hours of symptoms
Other Things to Consider

- Reactive Airway Disease
- Anaphylaxis
- Trauma
Questions?