

# Croup: Emergency Department

Clinical Practice Guideline (CPG)

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## Algorithm for Pediatric Croup Management in the Emergency Department

### Triage Phase

This guideline is intended for use in previously healthy patients, aged 6 months to 6 years presenting to the ED for a constellation of symptoms including:

- barking cough
- hoarse voice
- stridor

### Exclusion criteria:

- medically complex patient
- known neuromuscular disease
- known airway obstruction including: vocal cord paralysis, tracheomalacia, laryngomalacia, tracheoesophageal fistula, vascular ring
- witnessed or suspected foreign body aspiration

Further considerations:  
See box below

No stridor at rest and No respiratory distress = Mild Croup

Stridor at rest + Respiratory Distress = Moderate to Severe Croup

- Dexamethasone 0.6mg/kg, max 10mg
- PO preferred route<sup>1</sup>

- Minimize intervention
- Place child on parent's lap or upright on stretcher
  - Provide position of comfort
  - Provide 'blow by' humidified oxygen or cool mist (optional unless cyanosis is present)

#### Discharge criteria:

- No more than minimal stridor at rest
- No more than minimal retractions at rest
- Tolerates PO intake

- Nebulize epinephrine
  - Racemic epinephrine 2.25% :0.05 mL/kg, max 0.5 ml, in 2.5 mL saline
- Dexamethasone, 0.6 mg/kg PO/IV/IM, max 10mg<sup>1</sup>
- Consider Budesonide<sup>3</sup>

Reassess after completion of treatment

Improved?

No Respiratory Distress  
No more than minimal retractions at rest  
No more than minimal stridor at rest

YES

NO

- Observe for at least 2 hours for reoccurrence of moderate/severe symptoms
- Do symptoms reoccur?

YES

Repeat nebulized epinephrine

Improved?

NO

NO

YES

Disposition: Discharge

- Meets Discharge Criteria
- No more than minimal stridor at rest
  - No more than minimal retractions at rest
  - Tolerates PO intake

- Observe for at least 2 hours for reoccurrence of moderate to severe symptoms
- Disposition per ED Attending Discretion
  - If symptoms reoccur within 2 hours, repeat nebulized epinephrine and admit to PICU
  - If symptoms do not reoccur within 2 hours, consider admission to general pediatrics

- Repeat nebulized epinephrine
- Consider alternative diagnosis and treatments including:
  - Heliox<sup>2</sup>
  - Inhaled Budesonide<sup>3</sup>
  - Advanced/Surgical Airway<sup>4</sup>

Disposition: Admit

- Per ED Attending/PICU Attending Discretion
  - If no significant improvement or improved only after alternative treatments, admit to PICU
  - If requiring more than q 2 hour racemic epinephrine, admit to the PICU

1,2,3,4 – See attached form, Further Consideration, for additional information regarding specific therapy recommendations.

**Background:** Croup, or laryngotracheobronchitis, is a common upper respiratory tract infection. The most common viral causes are parainfluenza viruses, adenovirus, respiratory syncytial virus, rhinovirus, enteroviruses and influenza viruses A and B. In the pediatric population, approximately 3/100 children acquire the disease each year. This leads to multiple emergency department visits and hospital admissions across the country. It most often infects children aged 6 months to 36 months of age with admission rates being reported as high as 6%.

The goal of this protocol is to standardize the evaluation of these patients, adapting a standardized scoring of these that then guides appropriate level of care and medical management of these patients to optimize patient care, and reduce errors in treatment of these patients.

### **Objectives:**

1. Create a standardized way to evaluate, triage children with croup
  - a. Reduce ED visit duration
  - b. Reduce return to ED for related diagnosis/complaint within [timeframe—need ED consensus]
  - c. Reduce unnecessary testing (x-rays, viral testing)
  - d. Reduce unnecessary medication usage (racemic epinephrine)
  - e. Ensure all croup patients receive dexamethasone
2. Create an order set that allows consistent and appropriate management of these children requiring evaluation in the emergency room and throughout their hospital admission
3. Create and evaluate the following metrics
  - a. Correct identification/diagnosis of croup patient cohort
  - b. Rate of ED revisit
  - c. % patients receiving dexamethasone
  - d. % patients receiving x-rays
  - e. % patients receiving racemic epinephrine
  - f. % Admission from ED
  - g. Total Time spent in ED

### **Definitions:**

**Stridor**—high pitched respiratory noise; characterized by the phase of breathing (inspiratory, expiratory, biphasic); croup is characterized by expiratory or biphasic stridor

**Cyanosis**—physical examination finding of bluish discoloration of skin or mucous membranes

## Assessment and Diagnosis:

The following validated scoring system, adapted by Westley et al., has been widely used in the clinical evaluation of pediatric croup to quantify disease severity and may be help. However, any patient with stridor at rest and or respiratory distress may be treated as moderate to severe croup.

### Westley Croup Severity Score

<i>Clinical Sign</i>	<i>Degree</i>	<i>Score</i>
<b>Stridor</b>	None	0
	At rest on auscultation	1
	At rest without auscultation	2
<b>Chest Wall Retractions</b>	None	0
	Mild	1
	Moderate	2
	Severe	3
<b>Air Entry</b>	Normal	0
	Decreased	1
	Severely Decreased	2
<b>Cyanosis</b>	None	0
	With Agitation	4
	At rest	5
<b>Consciousness Level</b>	Normal	0
	Altered	5
<i>Possible Score 0-17 with:</i>		<i>Mild Croup &lt;4</i>
		<i>Moderate Croup 4-6</i>
		<i>Severe Croup &gt; 6</i>

## Further Considerations

Dexamethasone	<p>Preferred route is oral administration. The IV formulation, administered orally is regularly used and frequently better tolerated than Dexamethasone oral solution or Dexamethasone Intensol (oral brand carried by many local pharmacies).</p> <ul style="list-style-type: none"> <li>• Consider IV/IM in those with moderate to severe respiratory distress</li> <li>• Recent evidence shows lower doses of 0.15mg/kg and 0.3 mg/kg to be as effective as 0.6mg/kg.</li> </ul>
Nebulized Epinephrine	<ul style="list-style-type: none"> <li>• Racemic Epinephrine 2.25% may be given as 0.5 ml diluted in NS to 3 ml total for all weights/ages.</li> <li>• Racemic Epinephrine 2.25% dosed at 0.05ml/kg, max 0.5ml is also an accepted standard dose</li> <li>• If racemic epinephrine is not available, L-epinephrine 1:1000, 5 ml may be used.</li> </ul>
Budesonide	<p>Inhaled budesonide has been shown to be non-inferior to dexamethasone in treatment of croup when used with in combination racemic epinephrine. Onset of action may be quicker, but may have a shorter duration than dexamethasone. We therefore recommend this as an adjunct treatment for patients in continued respiratory distress</p> <ul style="list-style-type: none"> <li>• Budesonide 2mg Inhaled, once</li> </ul>
Advanced/Surgical Airway	<p>Preparations should be made for a difficult airway in a patient with croup that requires intubation. Consider intubation in the OR with an anesthesiologist. Consider Anesthesia, ENT and or Surgery at the bedside for additional difficult airway support.</p>
Heliox	<p>Mixture of helium and oxygen in a ratio of 70/30, 80/20 and 60/40. Use shows a reduction in resistance to flow within the airways and may improve work of breathing. Administer via nonrebreather face mask at 10L /min.</p>
Radiographs—airway xray or chest xray	<p>Not routinely recommended Consider if</p> <ul style="list-style-type: none"> <li>• Witnessed or suspected foreign body aspiration</li> <li>• Clinical course suggests other etiology such as concurrent lower respiratory tract infection</li> <li>• Croup diagnosis in question/not high on differential</li> </ul>
Respiratory Viral Panel Testing	<p>Not routinely recommended Consider if</p> <ul style="list-style-type: none"> <li>• Prolonged fever</li> <li>• Croup diagnosis in question/not high on differential</li> </ul> <p>Isolation precautions—institute as indicated</p>

ENT Consultation in ED	<p>Not routinely recommended</p> <p>Consider if</p> <ul style="list-style-type: none"> <li>• Witnessed or suspected foreign body aspiration</li> <li>• Known airway anatomy abnormality</li> <li>• Suspected bacterial tracheitis</li> <li>• Unresponsive to steroids and/or epinephrine</li> </ul>
Outpatient Referral to ENT	<p>If patient deemed stable for discharge, consider referral if</p> <ul style="list-style-type: none"> <li>• History of prolonged intubation</li> <li>• History of recurrent croup <ul style="list-style-type: none"> <li>○ More than 1 episode within past 30 days</li> <li>○ More than 3 episodes within past 12 months</li> </ul> </li> <li>• Any known airway abnormality, including but not limited to subglottic stenosis</li> </ul>
Known Subglottic Stenosis	<p>Continue to follow the croup algorithm with a low threshold to escalate to a higher level of care</p> <ul style="list-style-type: none"> <li>• These patients may warrant ICU level of care while a patient with similar appearance would be considered for floor status</li> <li>• This is due to potential for rapid clinical deterioration</li> </ul>
Epiglottitis	<p>More likely in unimmunized individuals</p> <p>If concerned for this diagnosis, recommend</p> <ul style="list-style-type: none"> <li>• Minimal interventions should be performed in the ED</li> <li>• Immediately contact Anesthesiology and ENT for possible need for surgical airway management or intubation in the Operating Room</li> </ul>
Bacterial Tracheitis	<p>Bacterial infection of the trachea, leading to mucopurulent membranous formation and subsequent upper airway obstruction</p> <ul style="list-style-type: none"> <li>• Patients may appear more toxic and have higher fevers than viral croup</li> <li>• Consider in a toxic appearing patient with high fever, who had “typical croup” for several days, especially in older patients 6-10 years of age, who now acutely worsen</li> <li>• Stridor is unresponsive to epinephrine</li> <li>• As this may be caused by many bacterial species, including staph species, M. catarrhalis, strep species, and H. flu, appropriate broad-spectrum antibiotics should be started as soon as possible.</li> <li>• X-rays of the upper airway may show the characteristic “irregular tracheal borders”</li> <li>• An emergency ENT consult should be obtained whenever suspected as this is a true surgical emergency</li> </ul>
Supplemental Oxygen	<p>Not routinely recommended for oxygen saturation &gt;90%</p> <p>Consider alternate diagnosis if oxygen saturation &lt;90%</p> <ul style="list-style-type: none"> <li>• Croup is not typically characterized by significant hypoxemia</li> </ul>

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