

Croup

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What is a Clinical Pathway?



An evidence-based guideline that decreases unnecessary variation and helps promote safe, effective, and consistent patient care.

Objectives of Pathway



- To improve both emergency department and inpatient croup care through consistent application of current best practice
 - To reduce the frequency of unnecessary testing (viral testing, chest or lateral neck x-rays)
 - To reduce the use of medical interventions which are not evidence-based (antibiotics, albuterol, prednisolone, inhaled corticosteroids, cool mist humidification)
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Why is Pathway Necessary?



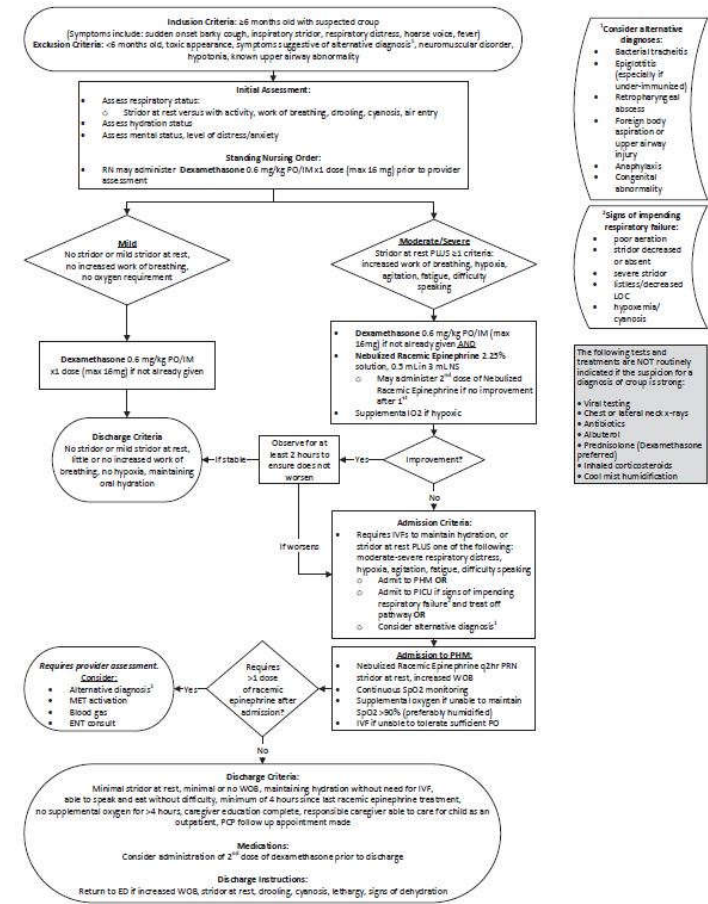
- The most common infectious cause of upper airway obstruction in children
 - Accounts for 15% of all respiratory tract disease in pediatric practice
 - 3-5% of all children will get croup at some point in their lives, but only 5-10% of these cases are severe enough to require hospital admission
-

This is the Croup Clinical Pathway.

We will be reviewing each component in the following slides.

CLINICAL PATHWAY:
Croup

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



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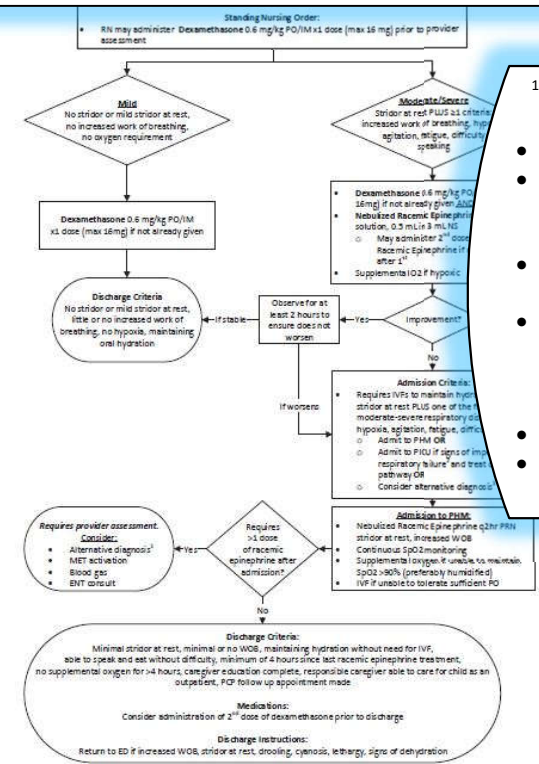
Inclusion Criteria:

- ≥6 months old with suspected croup (symptoms include: sudden onset barking cough, inspiratory stridor, respiratory distress, hoarse voice, fever)

Exclusion Criteria:

- <6 months old
- Toxic appearance
- Symptoms suggestive of alternative diagnosis
 - Bacterial tracheitis
 - Epiglottitis (especially if under-immunized)
 - Retropharyngeal abscess
 - Foreign body aspiration or upper airway injury
 - Anaphylaxis
 - Congenital abnormality
- Neuromuscular disorder, hypotonia
- Known upper airway abnormality

Inclusion Criteria: ≥6 months old with suspected croup
(Symptoms include: sudden onset barking cough, inspiratory stridor, respiratory distress, hoarse voice, fever)
Exclusion Criteria: <6 months old, toxic appearance, symptoms suggestive of alternative diagnosis¹, neuromuscular disorder, hypotonia, known upper airway abnormality



1 Consider alternative diagnoses:

- Bacterial tracheitis
- Epiglottitis (especially if under-immunized)
- Retropharyngeal abscess
- Foreign body aspiration or upper airway injury
- Anaphylaxis
- Congenital abnormality

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Initial Assessment:

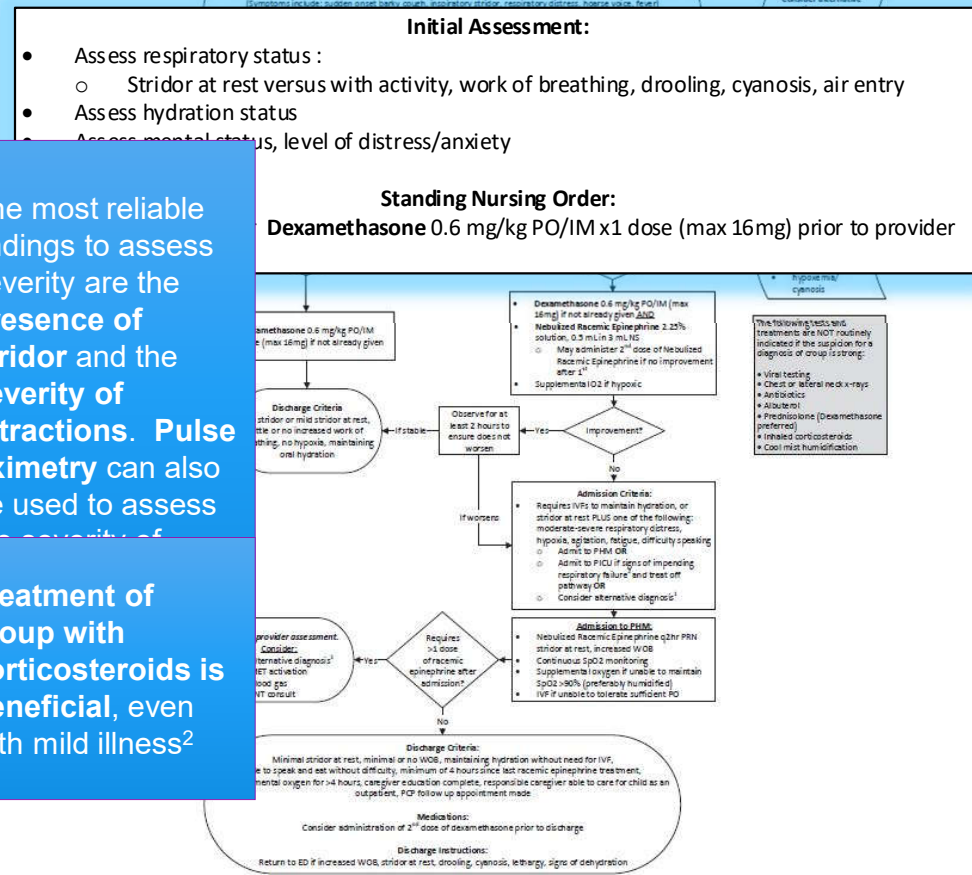
- Assess respiratory status (stridor at rest versus with activity, work of breathing, drooling, cyanosis, air entry)
- Assess hydration status
- Assess mental status, level of distress/anxiety

Standing Nursing Order:

- RN may administer **Dexamethasone 0.6 mg/kg PO/IM x1 dose (max 16mg)** prior to provider assessment

The most reliable findings to assess severity are the presence of stridor and the severity of retractions. Pulse oximetry can also be used to assess the severity of

Treatment of croup with corticosteroids is beneficial, even with mild illness²



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Mild

- Minimal or no stridor at rest
- Minimal or no work of breathing
- No oxygen requirement

Management

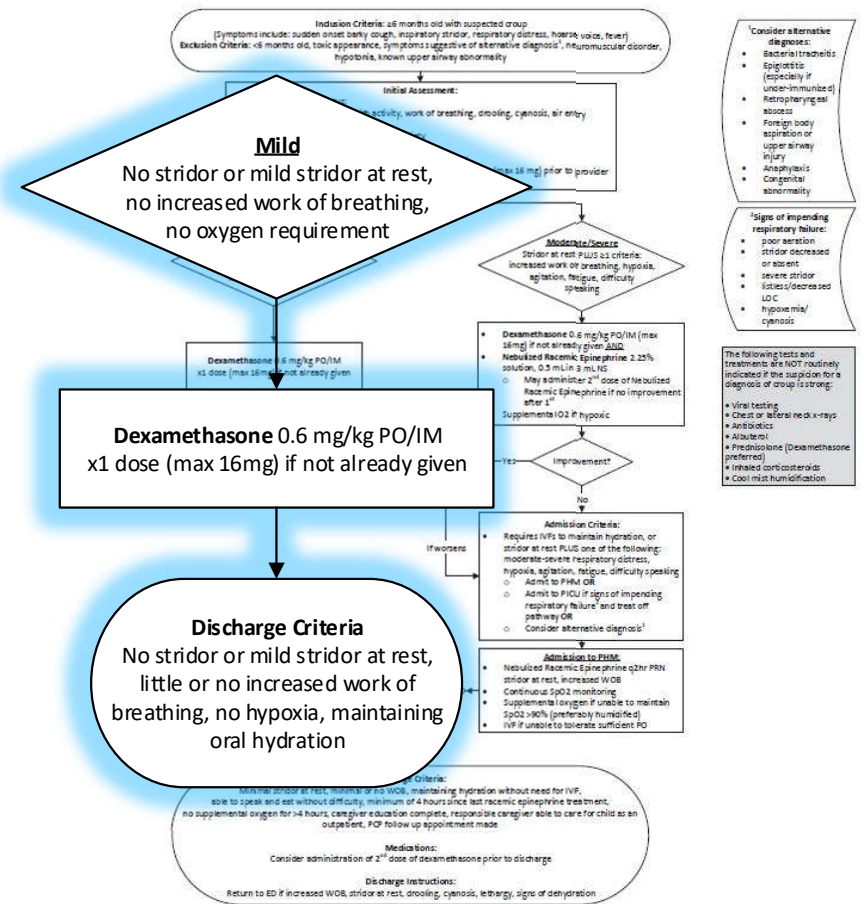
- **Dexamethasone 0.6 mg/kg PO/IM x1 dose (max 16mg) if not already given**

Discharge Criteria:

- No stridor or mild stridor at rest
- Little or no increased work of breathing
- No hypoxia
- Maintaining oral hydration

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Moderate/Severe

- Stridor at rest PLUS ≥1 criteria:
 - Increased work of breathing
 - Hypoxia
 - Agitation
 - Fatigue
 - Difficulty speaking

Management

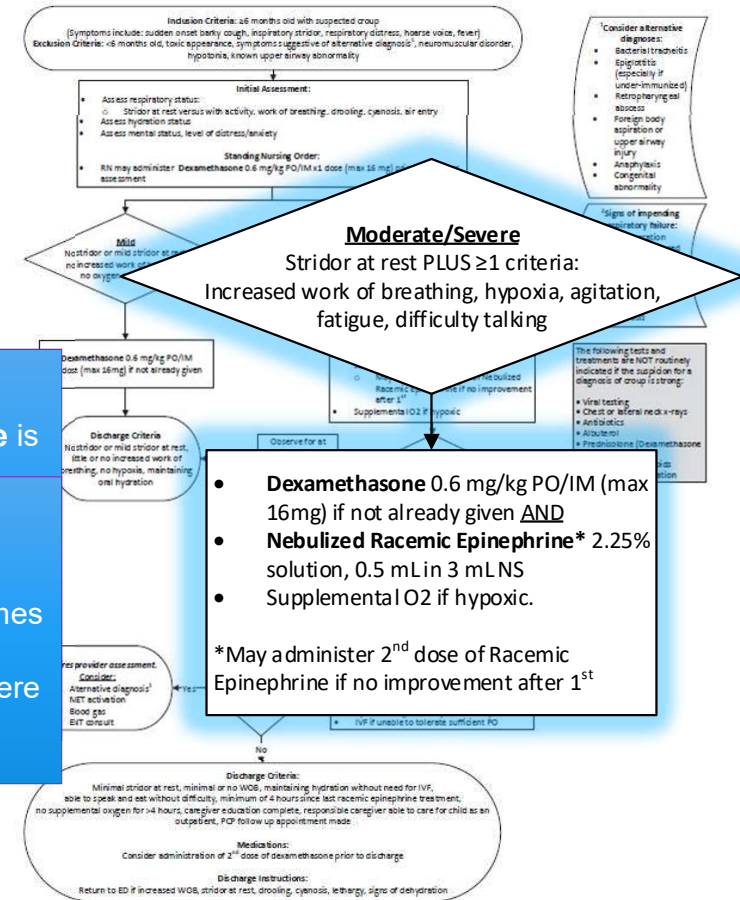
- **Dexamethasone 0.6 mg/kg PO/IM (max 16mg) if not already given AND**
- **Nebulized Racemic Epinephrine* 2.25% solution, 0.5 mL in 3 mL NS**
- Supplemental O2 if hypoxic.
 - *May administer 2nd dose of Racemic Epinephrine if no improvement after 1st

Oral dexamethasone is the preferred

Racemic epinephrine improves outcomes in patients with moderate to severe croup²

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If Improvement:

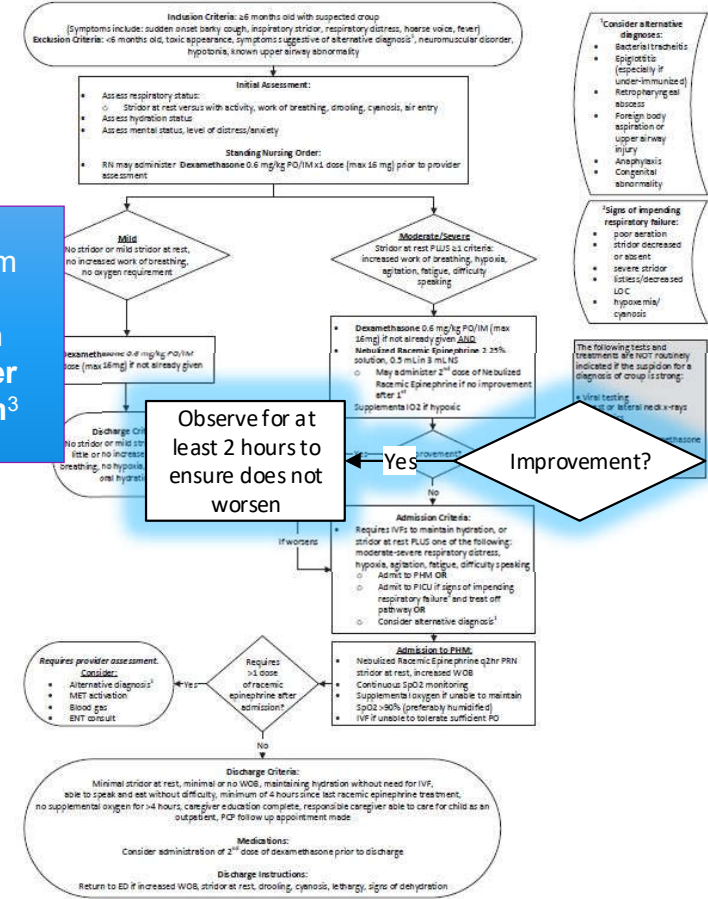
- Observe for at least 2 hours to ensure does not worsen

Discharge Criteria:

- No stridor or mild stridor at rest
- Little or no increased work of breathing
- No hypoxia
- Maintaining oral hydration

The effects from epinephrine dissipate within two hours after administration³

Observe for at least 2 hours to ensure does not worsen



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If No Improvement:

Admit to IMT: Admission Criteria

- Requires IVFs to maintain hydration, or
- Stridor at rest PLUS one of the following: moderate-severe respiratory distress, hypoxia, agitation, fatigue, difficulty speaking

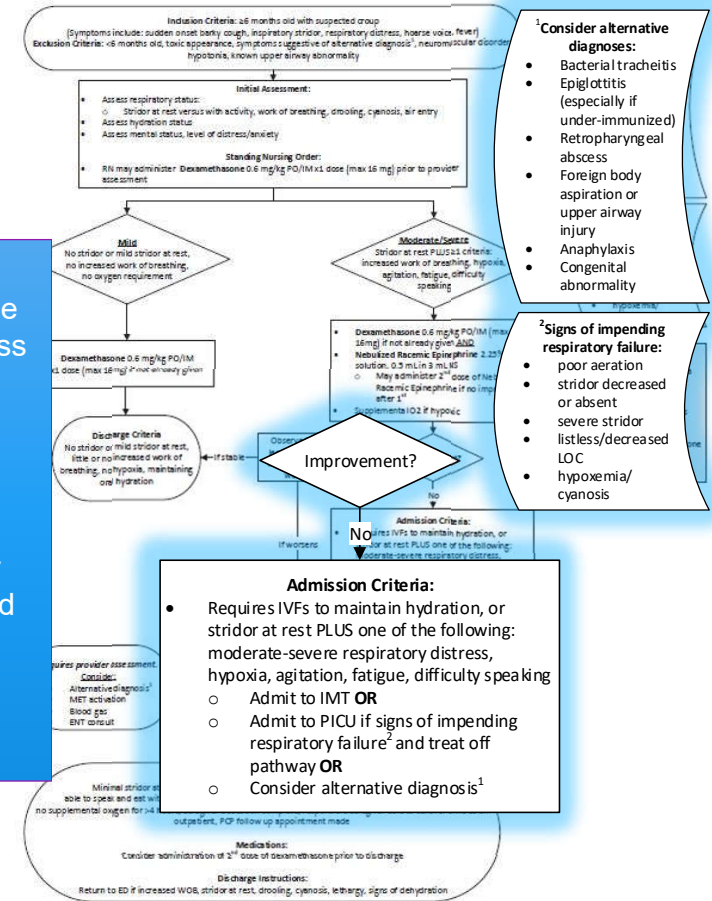
Admit to PICU if signs of impending respiratory failure:

- Poor aeration
- Stridor decreased or absent
- Severe stridor
- Listless/decreased LOC
- Hypoxemia/cyanosis

Consider alternative diagnosis:

- Bacterial tracheitis
- Epiglottitis (especially if under-immunized)
- Retropharyngeal abscess
- Foreign body aspiration or upper airway injury
- Anaphylaxis
- Congenital abnormality

The most reliable findings to assess severity are the presence of stridor and the severity of retractions. Pulse oximetry can also be used to assess the severity of disease²



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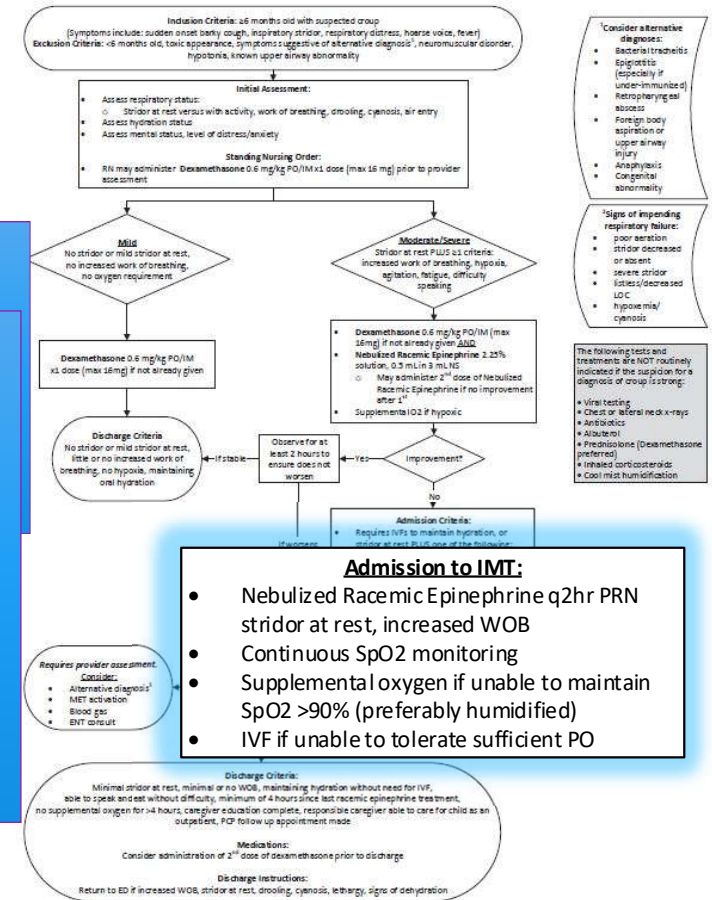
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Admission to IMT:

- Nebulized Racemic Epinephrine q2hr PRN stridor at rest, increased WOB
- Continuous SpO2 monitoring
- Supplemental oxygen if unable to maintain SpO2 >90% (preferably humidified)
- IVF if unable to tolerate sufficient PO

Racemic epinephrine

The most reliable findings to assess severity are the presence of stridor and the severity of retractions. Pulse oximetry can also be used to assess the severity of disease²



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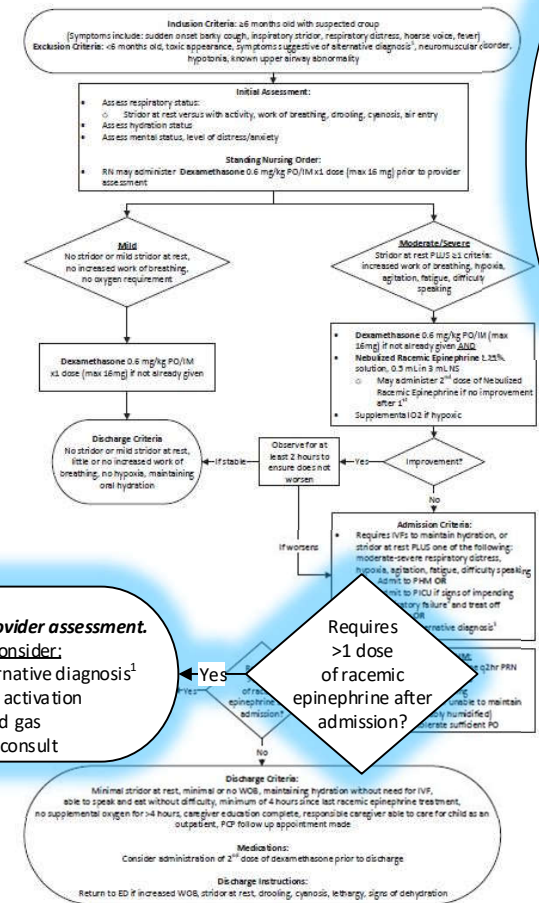


Requires >1 dose of racemic epinephrine after admission?

- Requires Provider Assessment
- Consider:
 - Alternative diagnosis
 - Bacterial tracheitis
 - Epiglottitis (especially if under-immunized)
 - Retropharyngeal abscess
 - Foreign body aspiration or upper airway injury
 - Anaphylaxis
 - Congenital abnormality
 - MET activation
 - Blood gas
 - ENT consult

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- ¹Consider alternative diagnoses:
- Bacterial tracheitis
 - Epiglottitis (especially if under-immunized)
 - Retropharyngeal abscess
 - Foreign body aspiration or upper airway injury
 - Anaphylaxis
 - Congenital abnormality

- The following tests and treatments are NOT routinely indicated if the suspicion for a diagnosis of croup is strong:
- Viral testing
 - Chest or lateral neck x-rays
 - Antibiotics
 - Albuterol
 - Prednisolone (Dexamethasone preferred)
 - Inhaled corticosteroids
 - Cool mist humidification

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Medications:

- Consider administration of 2nd dose of dexamethasone prior to discharge

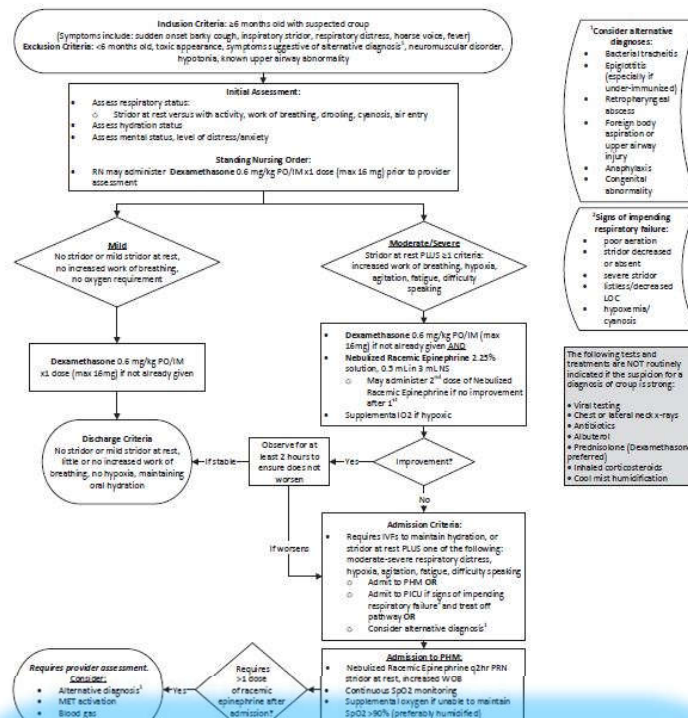
Discharge Instructions:

- Return to ED if:
 - Increased WOB
 - Stridor at rest
 - Drizzling
 - Cyanosis
 - Lethargy
 - Signs of dehydration

No randomized controlled trials have compared multiple versus single dosing. If continued therapy is required, other causes for airway obstruction or respiratory distress should be considered³

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Discharge Criteria:
Minimal stridor at rest, minimal or no WOB, maintaining hydration without need for IVF, able to speak and eat without difficulty, minimum of 4 hours since last racemic epinephrine treatment, no supplemental oxygen for >4 hours, caregiver education complete, responsible caregiver able to care for child as an outpatient, PCP follow up appointment made

Medications:
Consider administration of 2nd dose of dexamethasone prior to discharge

Discharge Instructions:
Return to ED if increased WOB, stridor at rest, drooling, cyanosis, lethargy, signs of dehydration

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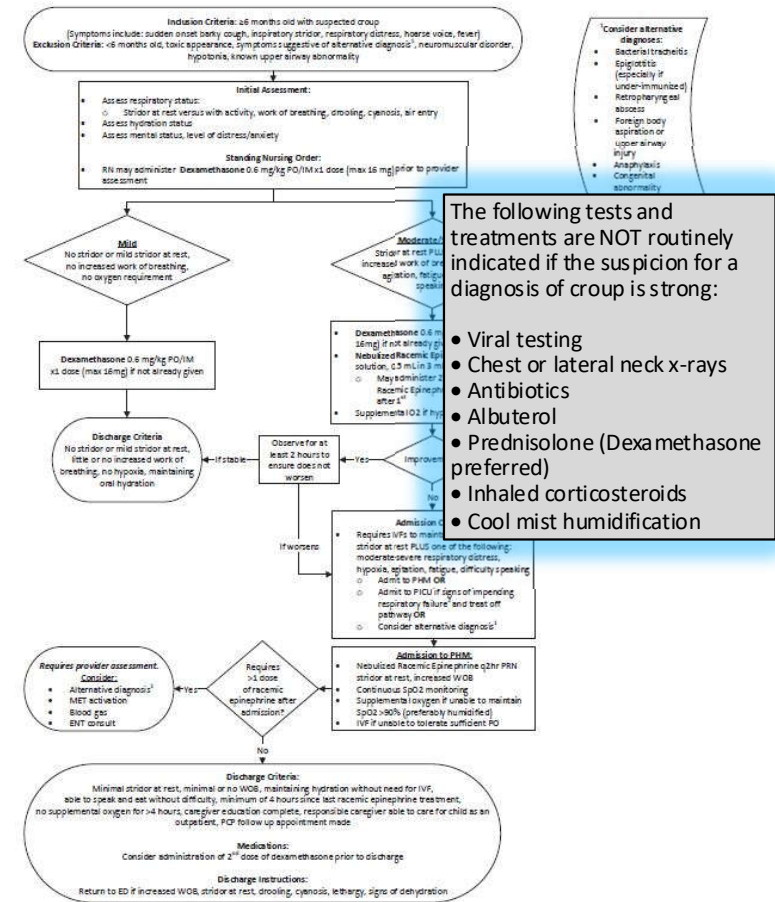
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- Studies do not support the routine use of exposure to cold air, antipyretics, analgesics, antitussives, decongestants, or prophylactic antibiotics³
- **Radiography may be considered** if the diagnosis is in doubt³
- **Budesonide is no more effective than dexamethasone**, is generally more traumatic, and is substantially more expensive, therefore it should not be routinely used⁴
- **Humidification therapy does not improve croup symptoms** in patients with mild to moderate disease³
- A single oral dose of prednisolone is **less effective than a single oral dose of dexamethasone** in reducing unscheduled re-presentation to medical care in children with mild to moderate croup³

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Review of Key Points



- Standing Nursing Order
 - RN may administer Dexamethasone prior to provider assessment in the ED¹
- Nebulized Racemic Epinephrine
 - Same dosing regardless of age/weight
 - Patients should be observed for at least two hours after administration to ensure that symptoms do not return after racemic epinephrine is no longer active³
 - Patients who get two doses of racemic epinephrine and have improved symptoms (no/mild stridor at rest, little or no increased work of breathing, no hypoxia, maintaining oral hydration) may be a candidate for discharge from the ED

Review of Key Points



- Multiple Doses of Nebulized Racemic Epinephrine
 - If patient requires >1 dose of racemic epinephrine after admission, patient requires provider assessment, consider further workup and consultation with Critical Care or ENT
- Multiple Doses of Dexamethasone³
 - Per provider discretion, consider administration of 2nd dose of dexamethasone for patients who are admitted to inpatient prior to discharge

Review of Key Points



- Tests and Treatments which are NOT routinely indicated^{2,3,4}
 - Viral testing
 - Chest or lateral neck x-rays
 - Antibiotics
 - Albuterol
 - Prednisolone (Dexamethasone preferred)
 - Inhaled corticosteroids
 - Cool mist humidification

Use of Order Set



General

ADT

Admit to Inpatient

Attending:

Team:

Patient Class: Inpatient

Diagnosis:

Place Patient in Observation

Attending:

Team:

Patient Class: Observation

Diagnosis:

Pathway

Initiate Clinical Pathway: Croup

Until discontinued, Starting today

Nursing

Isolation

Droplet isolation status

Details

Vital Signs

Vital signs-TPR, BP and O2 sats

Routine, Every 4 hours

Additional instructions:

BP site/location:

Additional instructions:

Routine, Continuous

May be off Monitor? No

Routine, Continuous

While Asleep

May be off Monitor?

Pulse oximetry

Cardiorespiratory monitoring

Use the "Croup" order set when admitting patients to the hospital.

This helps us keep track of those admitted with croup.

Quality Metrics



- Percentage of eligible patients treated per pathway
 - Percentage of patients with order set usage
 - Mean length of time from arrival to ED and administration of dexamethasone
 - Percentage of all patients receiving NRIRs (not routinely indicated resources)
 - Percentage of ED patients receiving NRIRs (not routinely indicated resources)
 - Length of stay ED (min) and inpatient (days)
 - Percentage of patients who return to ED within 7 days
-

Pathway Contacts



- Christina Giudice, APRN
 - Pediatric Hospital Medicine
- Eric Hoppa, MD
 - Pediatric Emergency Medicine
- Ilana Waynik, MD
 - Pediatric Hospital Medicine

References



- ¹ Klassen, T. P., Craig, W. R., Moher, D., Osmond, M. H., Pasterkamp, H., Sutcliffe, T., . . . Rowe, P. C. (1999, May 27). Nebulized Budesonide and Oral Dexamethasone for Treatment of Croup: A Randomized Controlled Trial. *Journal of the American Academy of Pediatrics*, 279(20), 1629-1632. doi:10.1001/jama.279.20.1629
- ² Zoorob, R., Sidani, M., & Murray, J. (2011, May 1). Croup: An Overview. *American Family Physician*, 83(9), 1067-1073. Retrieved from <https://www.aafp.org/afp/2011/0501/p1067.html>.
- ³Westley, C., Cotton, E.K., Brooks, J.G. (1978) Nebulized Racemic Epinephrine by IPPB for the Treatment of Croup: A Double-Blind Study. *Am J Dis Child*, 132(5):484–487. doi:10.1001/archpedi.1978.02120300044008
- ⁴Toward Optimized Practice (TOP) Working Group for Croup. (2008, January). Diagnosis and management of croup. *Toward Optimized Practice*. Retrieved from: http://www.topalbertadoctors.org/download/252/croup_guideline.pdf

Thank You!



About Connecticut Children's Clinical Pathways Program

Clinical pathways guide the management of patients to optimize consistent use of evidence-based practice. Clinical pathways have been shown to improve guideline adherence and quality outcomes, while decreasing length of stay and cost. Here at Connecticut Children's, our Clinical Pathways Program aims to deliver evidence-based, high value care to the greatest number of children in a diversity of patient settings.

These pathways serve as a guide for providers and do not replace clinical judgment

This Educational Module was edited by:

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