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)

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

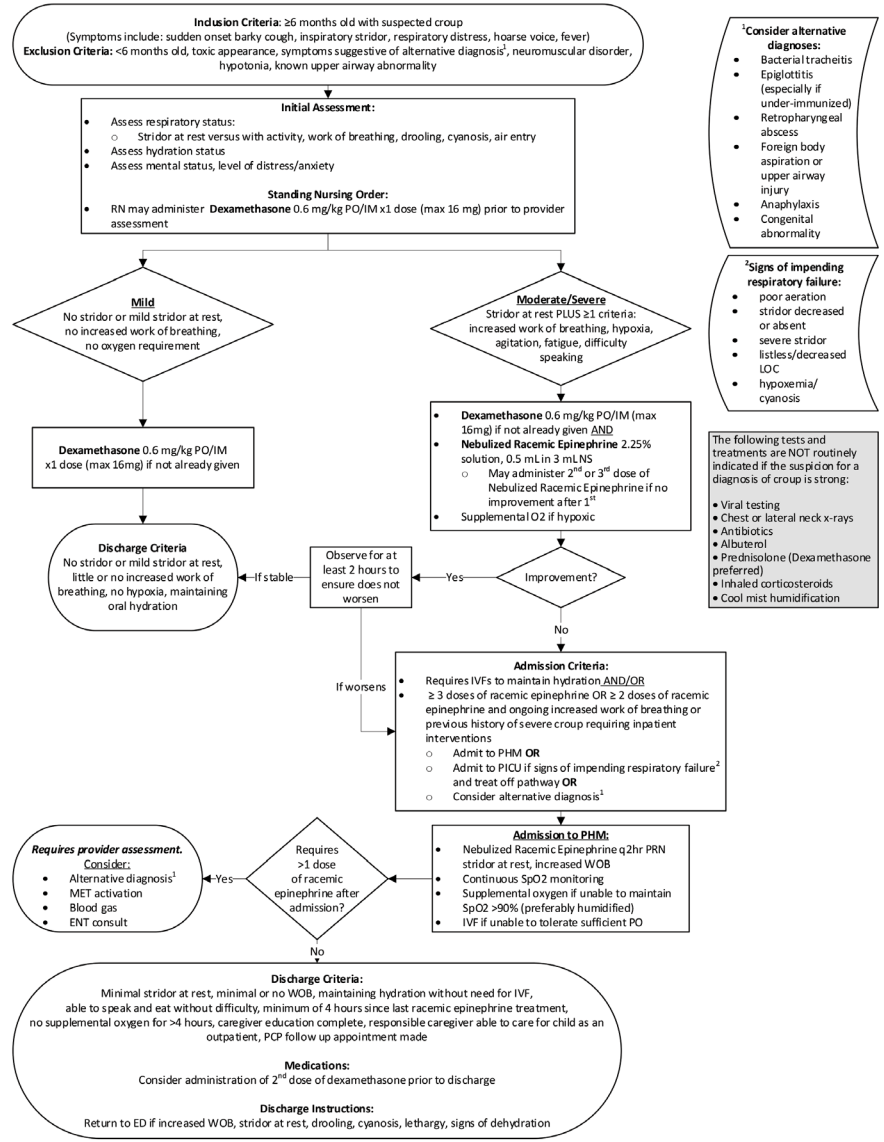
This is the Croup Clinical Pathway.

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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Literature supports use of clinical guidelines for management of croup and results in decreased rate of admission[5]

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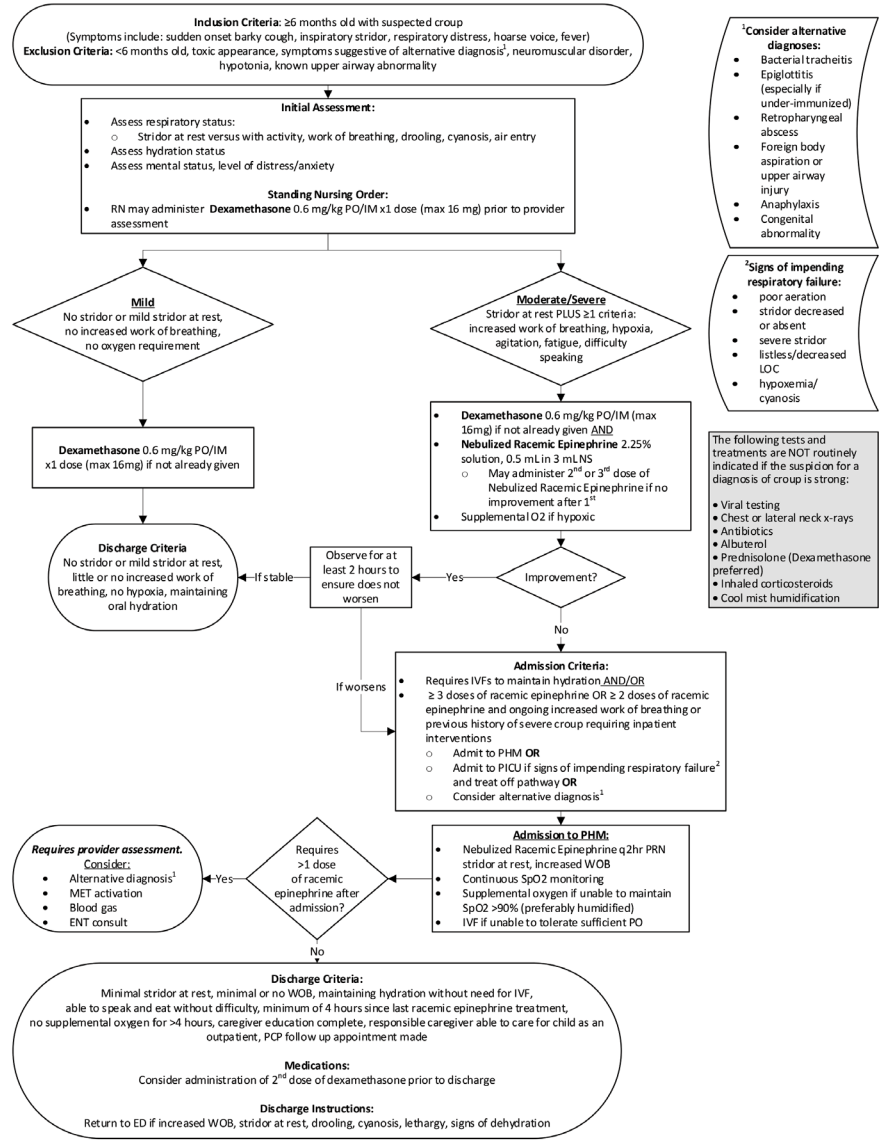

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Inclusion Criteria:

- ≥6 months old with suspected croup (symptoms include: sudden onset barky 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

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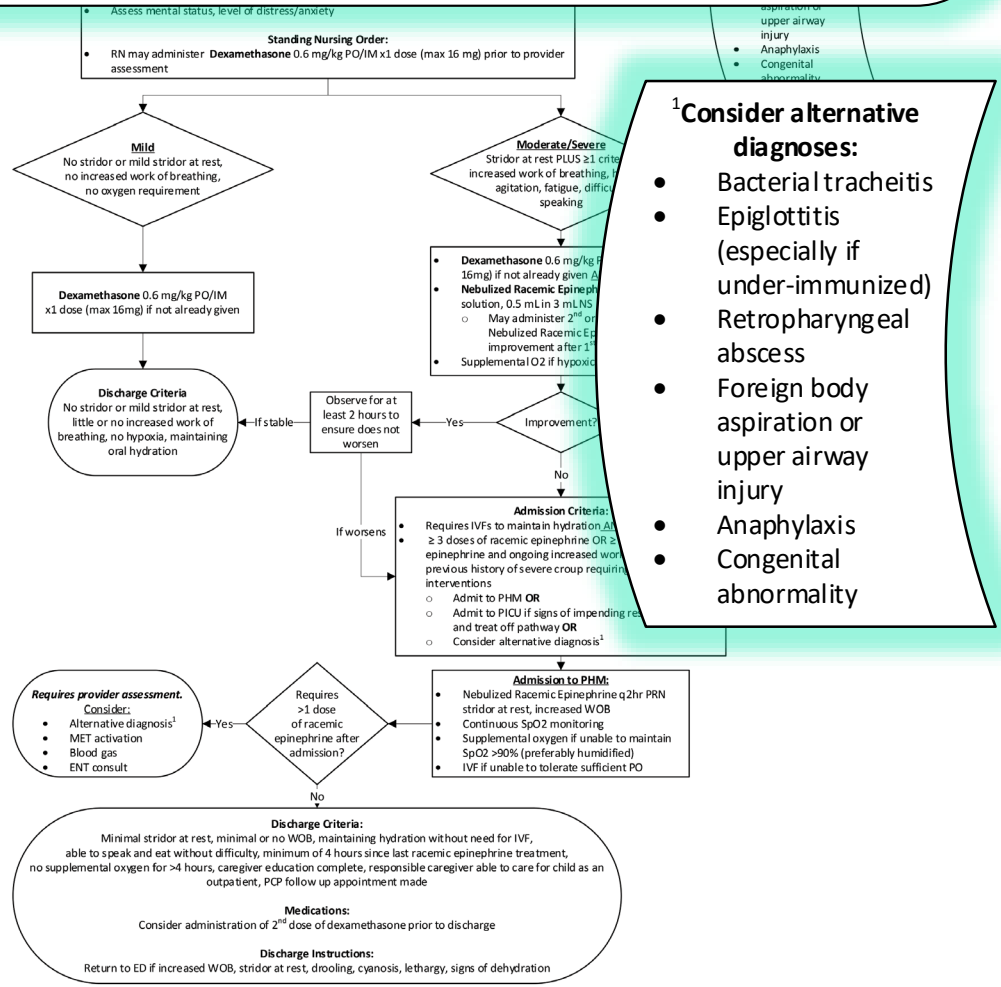
Inclusion Criteria: ≥6 months old with suspected croup
(Symptoms include: sudden onset barky cough, inspiratory stridor, respiratory distress, hoarse voice, fever)
Exclusion Criteria: <6 months old, toxic appearance, symptoms suggestive of alternative diagnosis[1], neuromuscular disorder, hypotonia, 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:

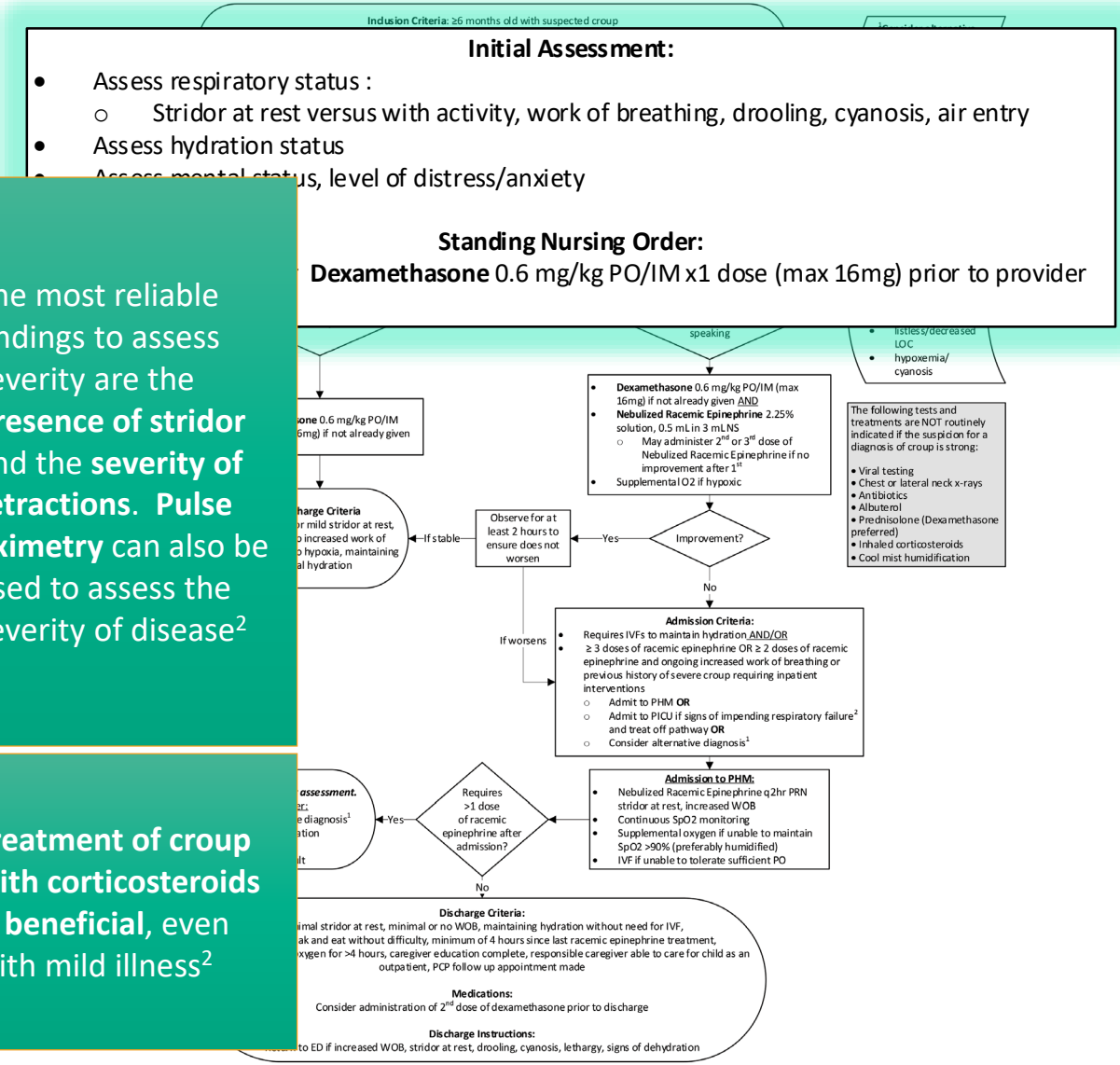
- Assess respiratory status (stridor at rest versus with activity, work of breathing, drooling, cyanosis, air entry)
- Assess hydration status
- Assess mental status, level of distress/anxiety

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 disease[2]

Treatment of croup with corticosteroids is beneficial, even with mild illness[2]



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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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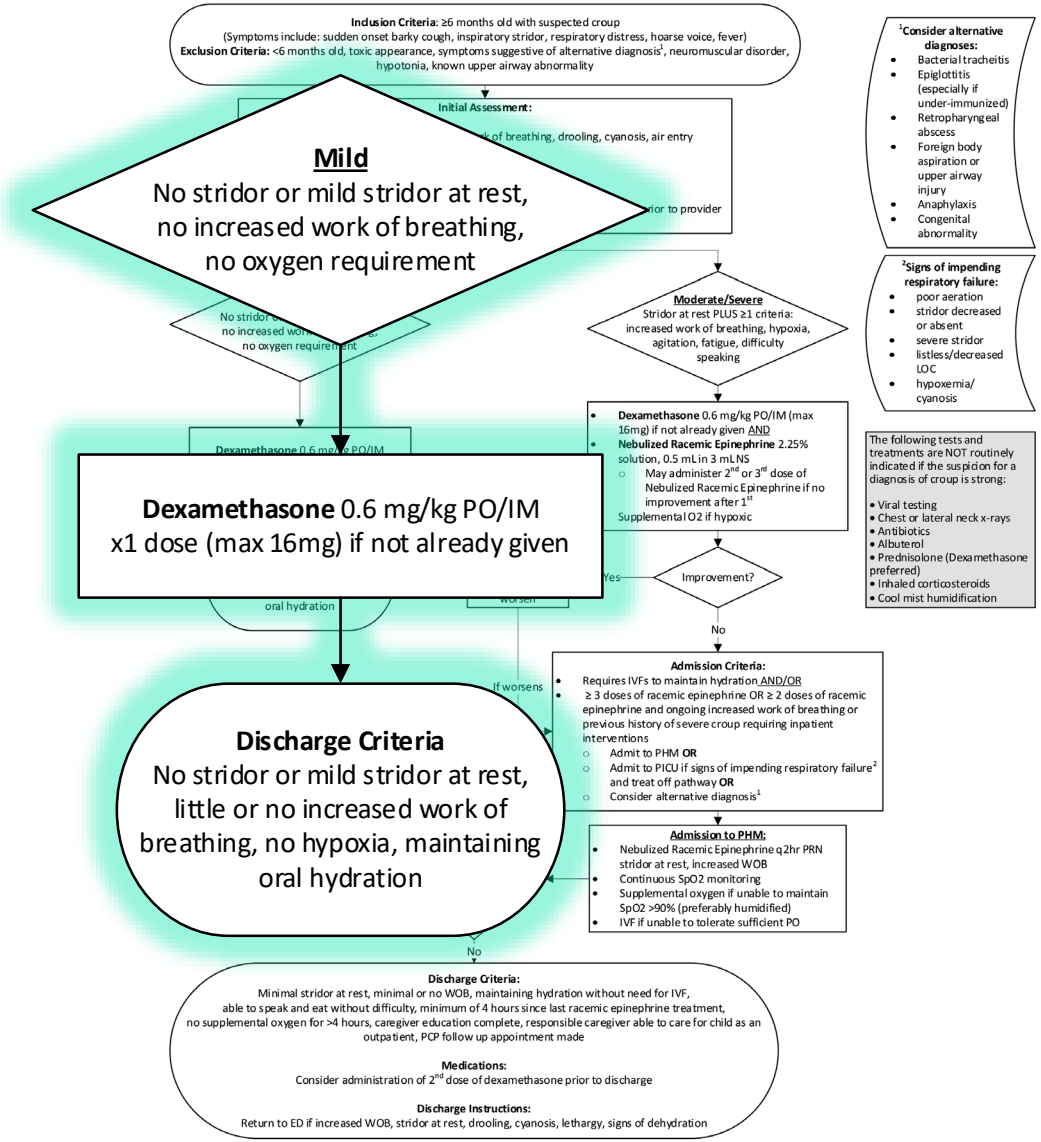

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Moderate/Severe

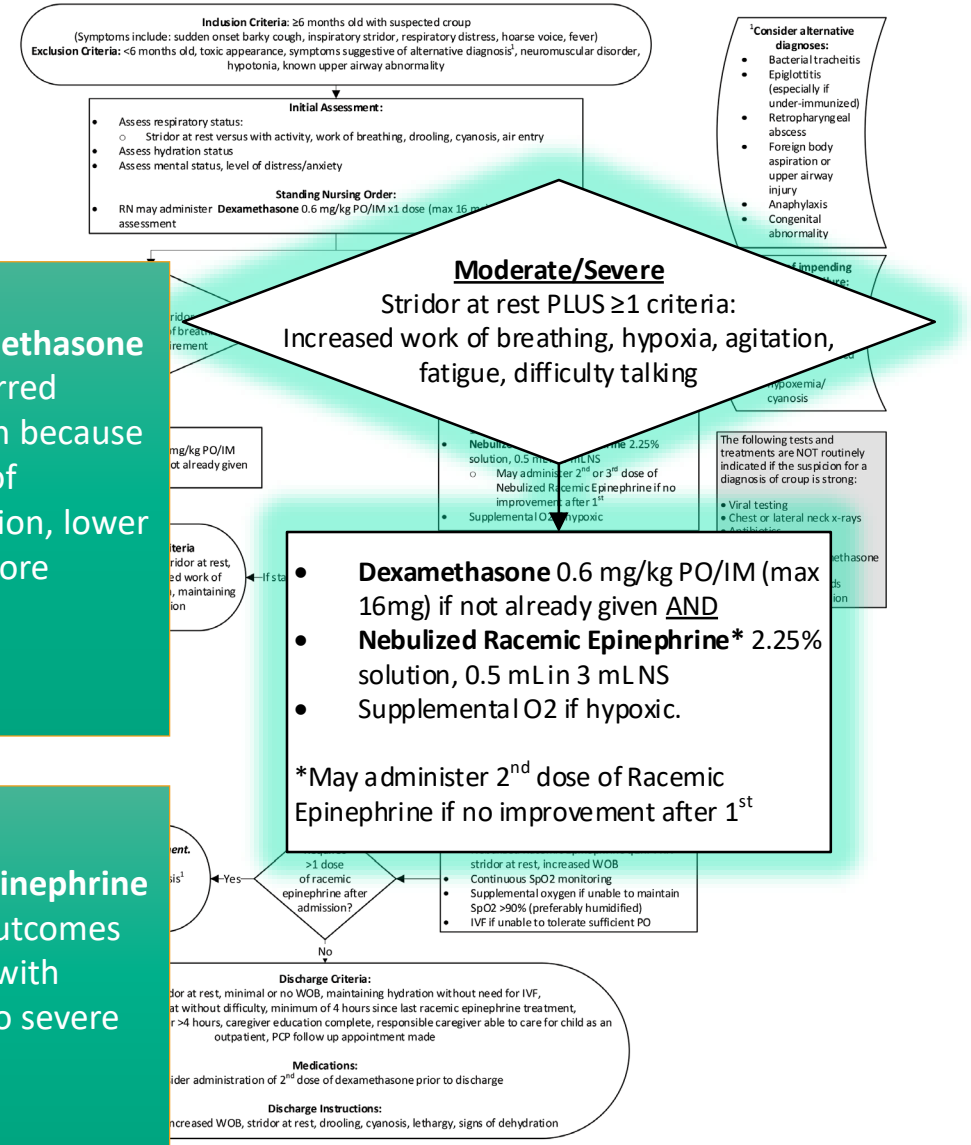
- Stridor at rest PLUS ≥1 criteria:
  - Increased work of breathing
  - Hypoxia
  - Agitation
  - Fatigue
  - Difficulty speaking

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 intervention because of its ease of administration, lower cost, and more widespread availability

Racemic epinephrine improves outcomes in patients with moderate to severe croup[2]



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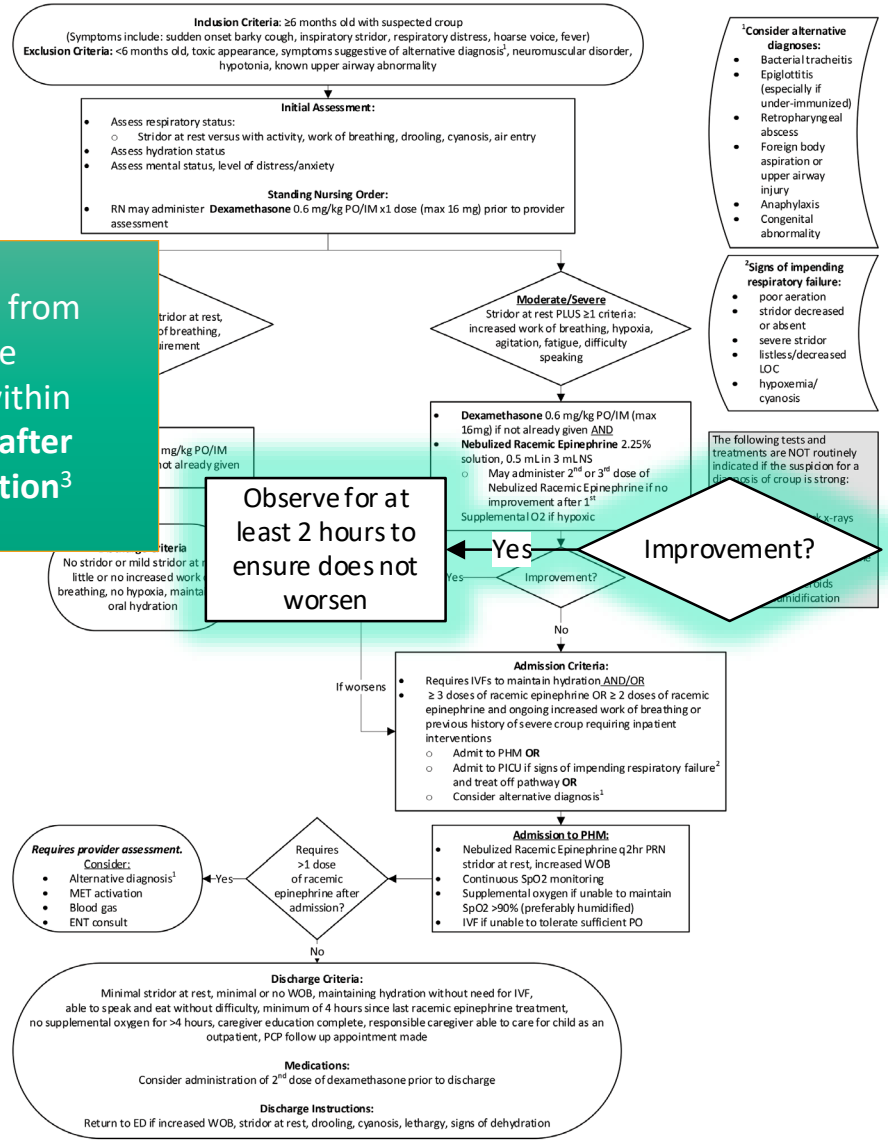
If Improvement:

- 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 administration**[3]



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If no improvement:

Admit to IMT: Admission Criteria

- Requires IVFs to maintain hydration AND/OR
- ≥ 3 doses of racemic epinephrine OR ≥ 2 doses of racemic epinephrine and ongoing increased work of breathing or previous history of severe croup requiring inpatient interventions

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 disease[2]

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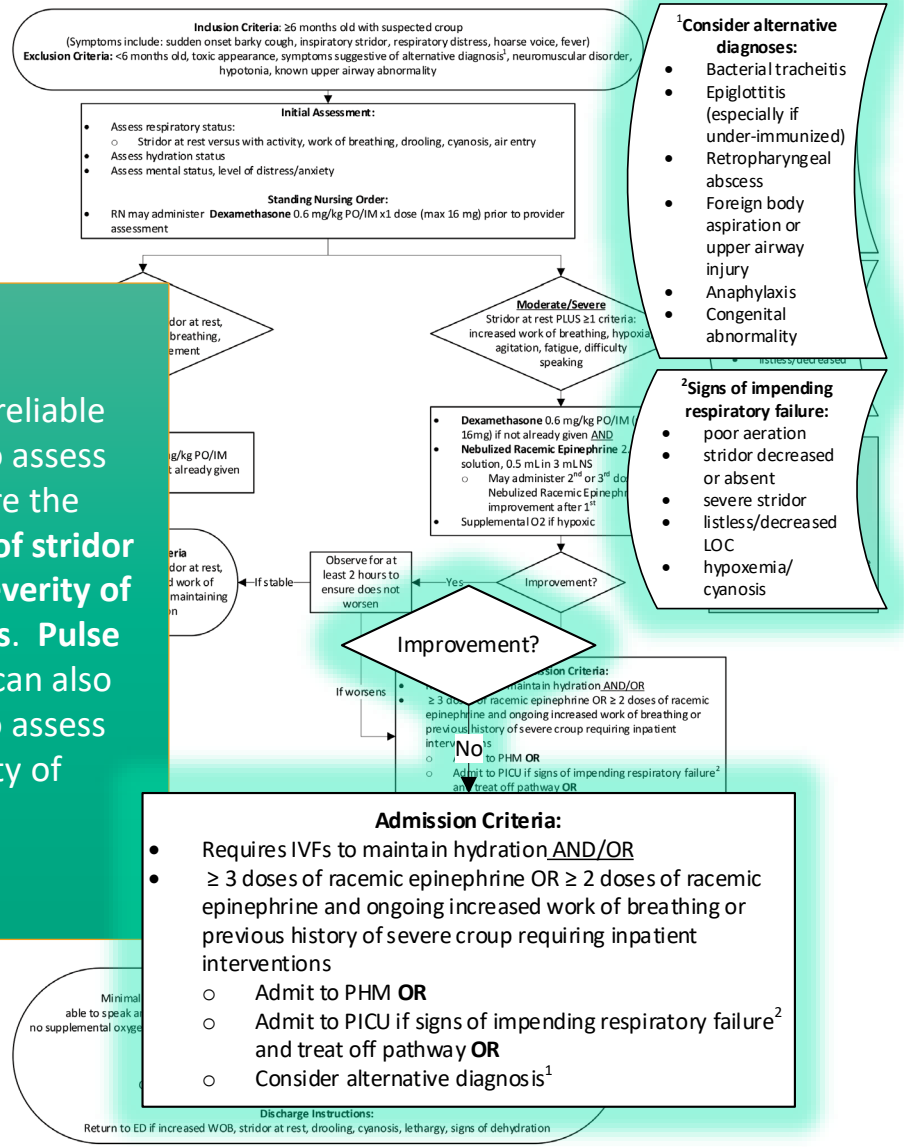

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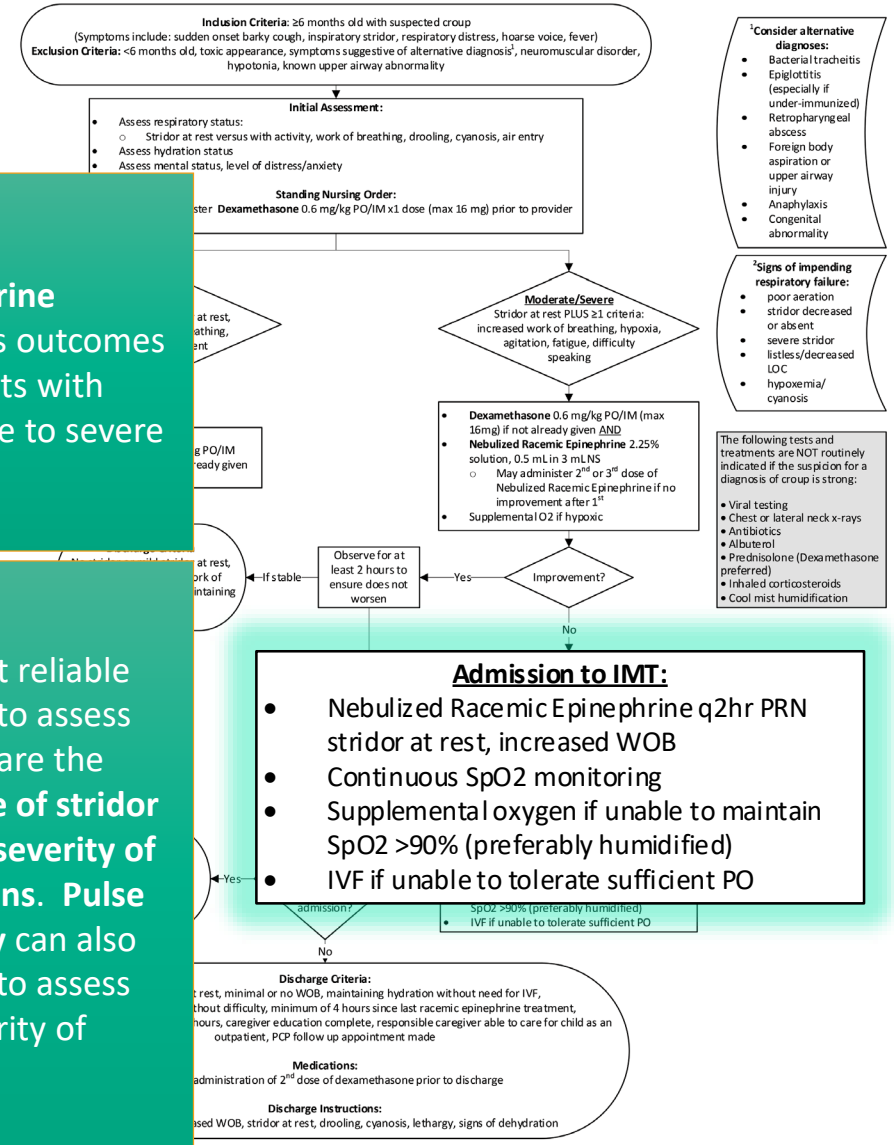
Admission to IMT:
- Nebulized Racemic Epinephrine q2hr PRN stridor at rest, increased WOB
- Continuous SpO2 monitoring
- Supplemental oxygen if unable to maintain SpO2 >90% (preferably humidified)
- IVF if unable to tolerate sufficient PO

Racemic epinephrine improves outcomes in patients with moderate to severe croup[2]

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 disease[2]



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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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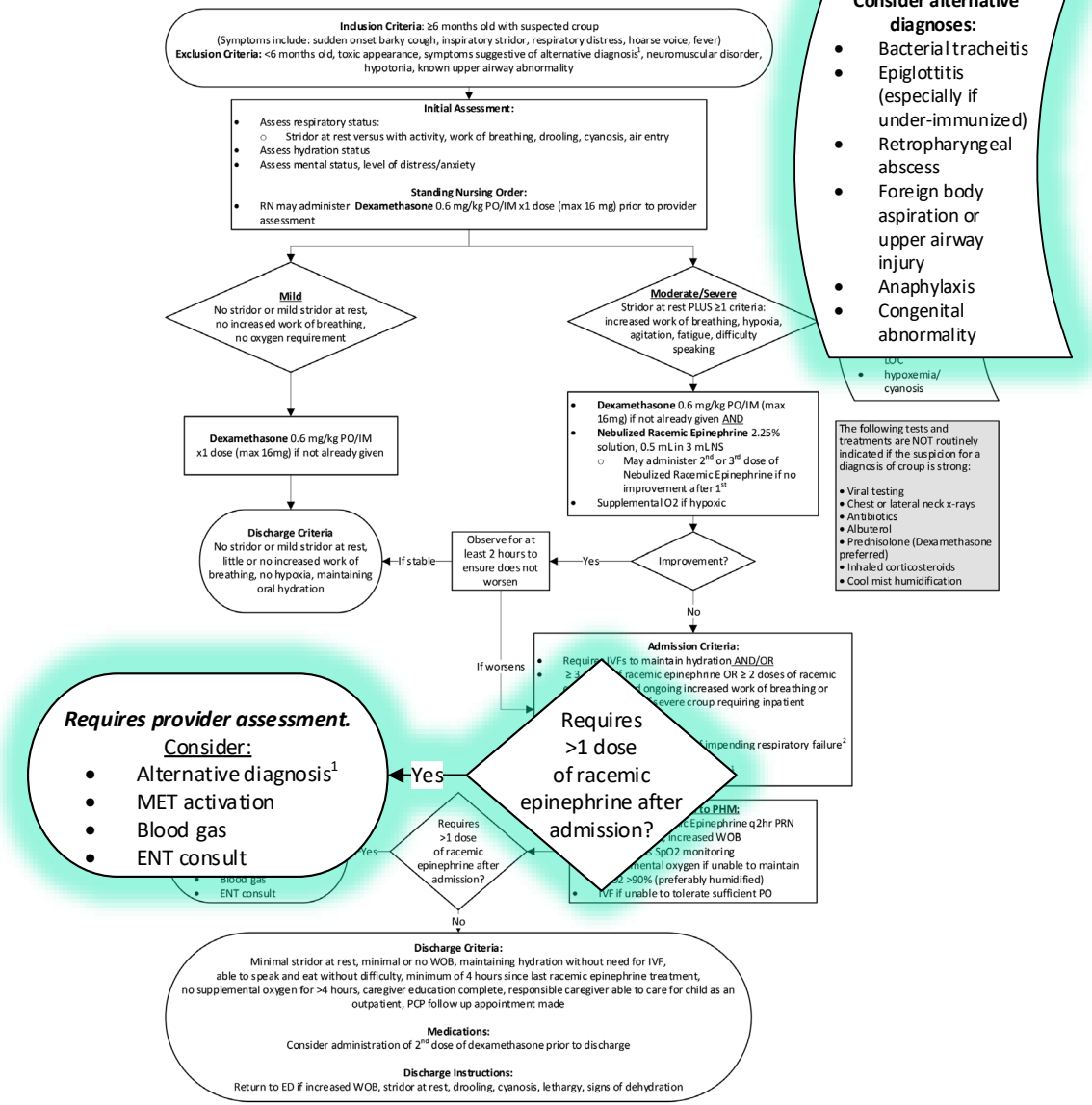

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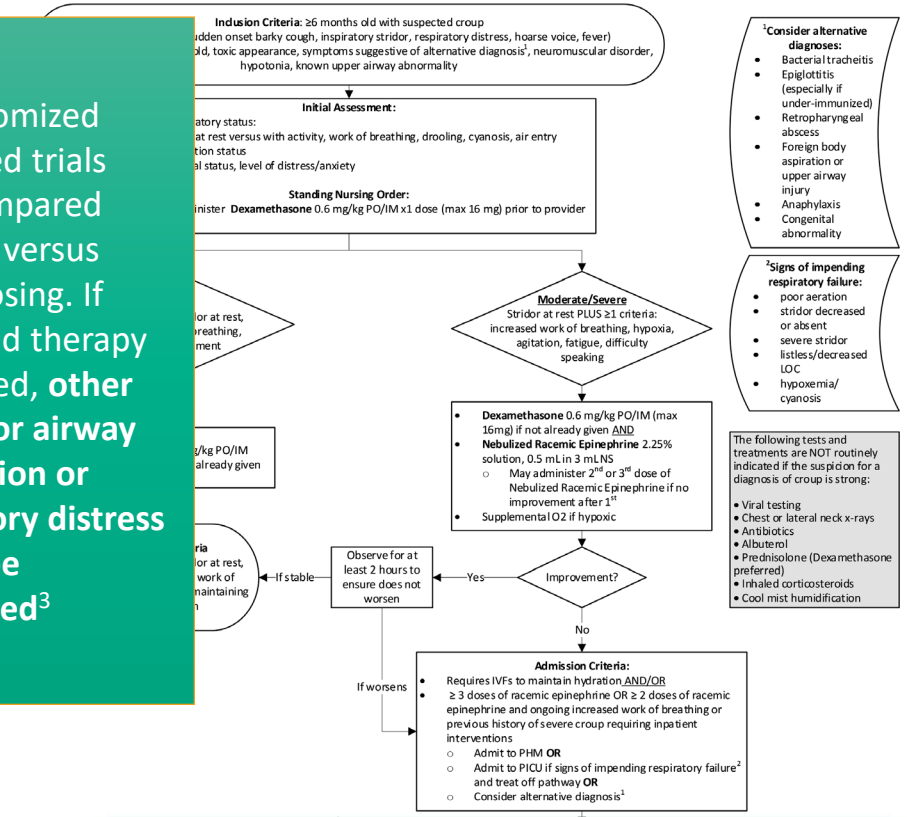
Medications:
- Consider administration of 2nd dose of dexamethasone prior to discharge

Discharge Instructions:
- Return to ED if:
  - Increased WOB
  - Stridor at rest
  - Drooling
  - 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 considered**[3]



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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- Studies do not support the routine use of exposure to cold air, antipyretics, analgesics, antitussives, decongestants, or prophylactic antibiotics[3]
- **Radiography may be considered** if the diagnosis is in doubt[3]
- **Budesonide is no more effective than dexamethasone**, is generally more traumatic, and is substantially more expensive, therefore it should not be routinely used[4]
- **Humidification therapy does not improve croup symptoms** in patients with mild to moderate disease[3]
- 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 croup[3]

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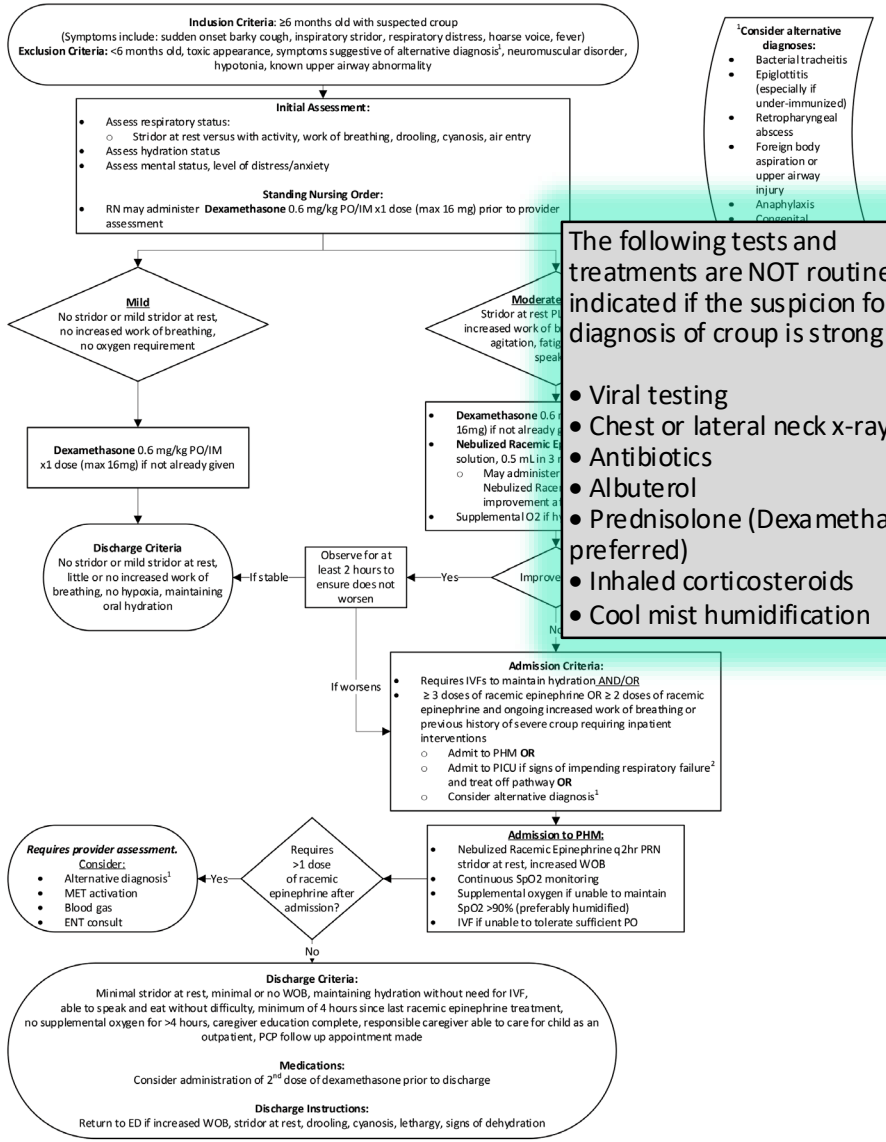

The following tests and treatments are NOT routinely indicated if the suspicion for a diagnosis of croup is strong:

- Viral testing
- Chest or lateral neck x-rays
- Antibiotics
- Albuterol
- Prednisolone (Dexamethasone preferred)
- Inhaled corticosteroids
- Cool mist humidification

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Review of Key Points

- Standing Nursing Order
  - RN may administer Dexamethasone prior to provider assessment in the ED[1]
- 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 active[3]
  - 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. May need to consider further workup and consultation with Critical Care or ENT
- Multiple Doses of Dexamethasone[3]
  - Per provider discretion, consider administration of 2nd dose of dexamethasone prior to discharge for patients who are admitted to inpatient

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:
- ☑ Pulse oximetry
  - Routine, Continuous
  - May be off Monitor? No
- ☐ Cardiorespiratory monitoring
  - Routine, Continuous
  - While Asleep
  - May be off Monitor?

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.
- [3]Westley, 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
- [4]Toward 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
- [5]Hester, G., Nickel, A. J., Watson, D., Maalouli, W., & Bergmann, K. R. (2022). Use of a clinical guideline and orderset to reduce hospital admissions for croup. *Pediatrics*, *150*(3), e2021053507

Thank You!

About Connecticut Children's 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.