

# Croup v.1: ED Management

[Executive Summary](#)

[Test Your Knowledge](#)

[Pathophysiology](#)

!

**Signs of impending respiratory failure**

- Poor respiratory effort
- Stridor may be present or decreased
- Lethargic or decreased LOC
- Cyanosis / [Hypoxemia](#)

## PHASE I (E.D.)

### Inclusion Criteria

- Previously healthy children
- Age 6 months to 6 years

### Exclusion Criteria

- Toxic appearance;
- Symptoms suggestive of an alternative diagnosis;
- Known upper airway abnormality
- Hypotonia or neuromuscular disorder

[Explanation of Evidence Ratings](#)

[Summary of Version Changes](#)

### Not Recommended

#### Cool Mist

- No evidence supporting the use of cool mist for treatment of croup

#### Viral FA

- No evidence that laboratory tests improve croup care

#### Radiographs

- No evidence that radiographs are necessary in croup with typical presentation that responds to therapy

#### Repeat Dexamethasone

- No evidence that repeat doses of dexamethasone improve outcomes

### Severity Assessment

Stridor at rest **AND** one or more of the following:

- Prominent sternal wall retractions
- Tachypnea
- Agitation / restlessness / tired appearing
- Difficulty with talking or feeding

No

Yes

### Give [Dexamethasone](#) (if not previously given)

- Dosage of 0.6mg/kg Dexamethasone
- Steroids are beneficial for all patients with croup

Discharge criteria not met

### Observation with Respiratory Assessment Q1 hour

- If worsening or not meeting discharge criteria consider racemic epinephrine
- Admit if discharge criteria not met in 2 hours

Evaluate criteria for racemic epinephrine

### Give [Racemic Epinephrine](#)

- Racepinephrine 2.25% inhalation solution (0.5 mL nebulized) diluted in 3 mL NS

**AND**

### Give [Dexamethasone](#) (if not previously given)

- Dosage of 0.6mg/kg Dexamethasone

Assess immediate clinical response

### Severity Assessment

- Stridor at rest
- Prominent sternal wall retractions
- Tachypnea
- Agitation / restlessness / tired appearing
- Difficulty with talking or feeding

!

Consider **BACTERIAL TRACHEITIS** in children who appear toxic, either before or after racemic epinephrine

Not improved

Consider alternative diagnosis or ICU admission

Off Pathway

Meets discharge criteria

Discharge criteria not met within 2 hours

### [Admit Criteria](#)

- Patients with continued stridor at rest **AND** any symptoms listed in the severity assessment above
- Patients receiving 2 doses of racemic epinephrine
- Patients not otherwise meeting discharge criteria

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### [Discharge Criteria](#)

- Minimal stridor at rest (stridor with activity to be expected)
- Minimal retractions
- Able to talk or feed without difficulty
- 2 hours since racemic epinephrine

Improved

### [Observation for 2 hr with minimum Q1 hour assessments](#)

- Racepinephrine effect lasts only 2 hours
- If patient worsens, consider repeat racemic epinephrine and admission

Meets discharge criteria

**Discharge Instructions**

- Return for increased work of breathing

!

Children who do not respond to racemic epinephrine may have an [alternative diagnosis](#). Consider further workup

# Croup v.1: Inpatient Management

## PHASE II (Inpatient)

**! Signs of impending respiratory failure**

- Poor respiratory effort
- Stridor may be present or decreased
- Lethargic or decreased LOC
- Cyanosis / **Hypoxemia**

**Inclusion Criteria**

- Previously healthy children
- Age 6 months to 6 years

**Exclusion Criteria**

- Toxic appearance;
- Symptoms suggestive of an alternative diagnosis;
- Known upper airway abnormality
- Hypotonia or neuromuscular disorder

**Not Recommended**

**Cool Mist**

- No evidence supporting the use of cool mist for treatment of croup

**Viral FA**

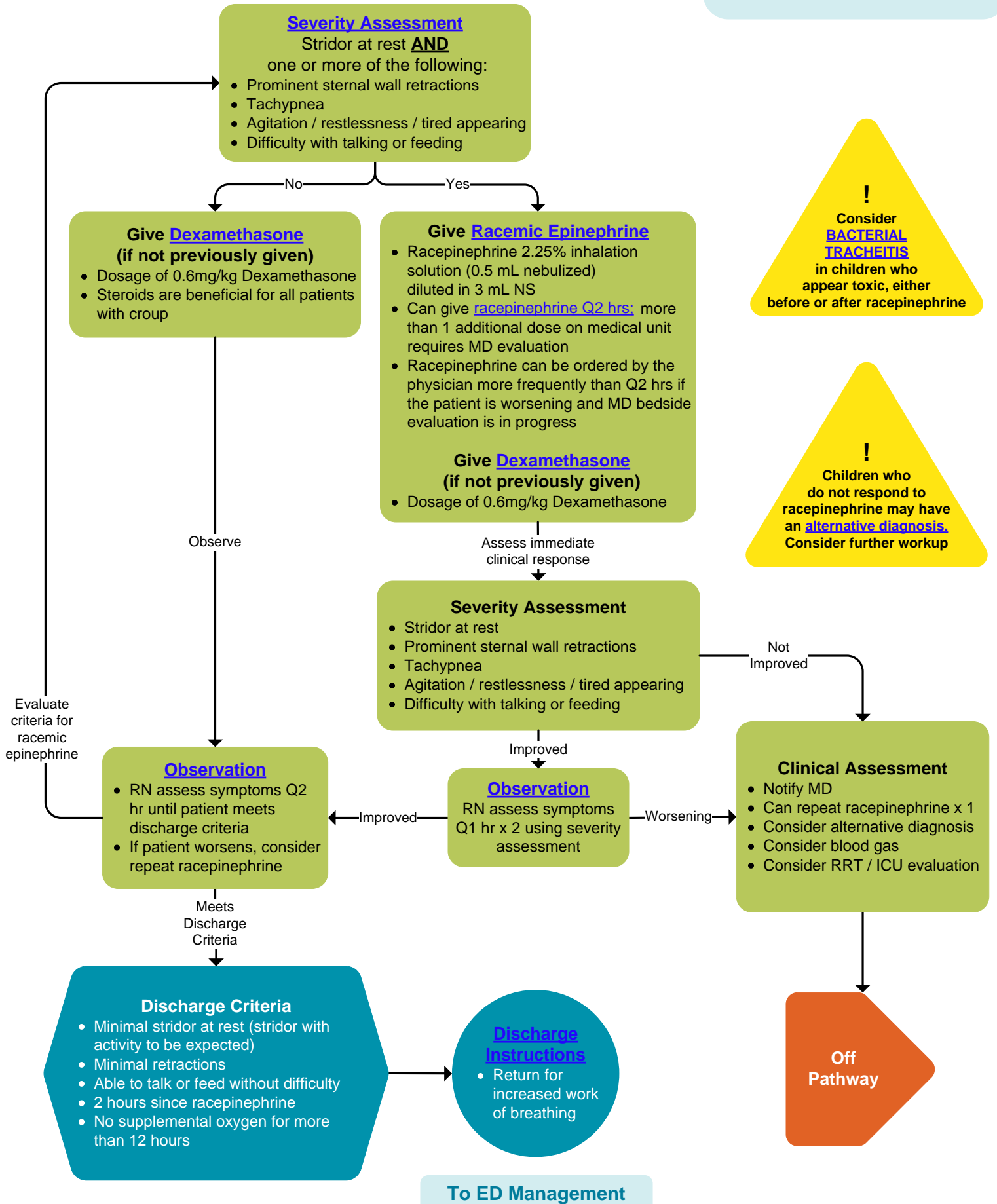
- No evidence that laboratory tests improve croup care

**Radiographs**

- No evidence that radiographs are necessary in croup with typical presentation that responds to therapy

**Repeat Dexamethasone**

- No evidence that repeat doses of dexamethasone improve outcomes



## Exclusion Criteria

- Toxic Appearance
- Symptoms suggestive of an alternative diagnosis:
  - Expiratory wheeze
  - Drooling or difficulty swallowing
  - Prolonged or recurrent stridor
  - Poor response to treatment
- Known upper airway abnormality
  - Laryngomalacia
  - Tracheomalacia
  - History of vascular ring/sling or tracheoesophageal fistula
- Hypotonia or neuromuscular disorder resulting in hypotonia
  - Trisomy 21

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## Background: Croup

- Also known as laryngotracheobronchitis
- Viral illness
- Most common in late fall to early winter
- Results in inflammation and swelling of the upper airway
- Most commonly caused by *Parainfluenza* virus
- Other causes include:
  - Respiratory syncytial virus
  - Influenza A and B
  - *Mycoplasma Pneumoniae*
  - Other respiratory viruses

## Symptoms

- Sudden onset of barky cough
- Inspiratory stridor
- Hoarse voice
- Respiratory distress
- Can be accompanied by fever
- May be abrupt in onset or be preceded by mild URI symptoms

## Natural Course

- Symptoms are usually worse at night
- Usually resolve within 48 hours
- Often followed by upper respiratory infection type symptoms

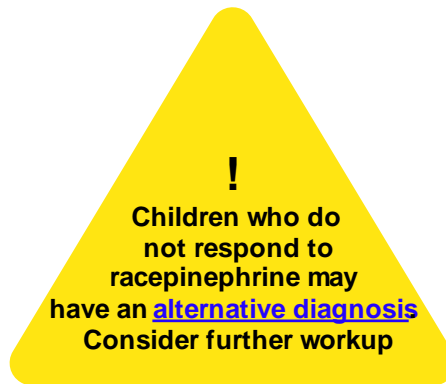
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## Racemic Epinephrine: Cautions!

Most patients with croup demonstrate rapid and significant improvement of symptoms with administration of racemic epinephrine

Consider further workup and removal from the croup clinical pathway if your patient does not show improvement with administration to racemic epinephrine



## Warning Signs: Alternative Diagnoses

Bacterial tracheitis:

- High fever
- Toxic appearance
- Poor response to epinephrine

Epiglottitis:

- Sudden upset of high fever
- **Absence** of barking cough
- Dysphagia
- Drooling
- Anxious appearance
- Sitting forward; “sniffing position”



## Alternative Diagnoses: Other Causes of Stridor

- Foreign body
- Retropharyngeal abscess
- Hereditary angioedema
- Congenital abnormality
  - Vascular ring or sling
  - Laryngomalacia

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## Warning Signs: Alternative Diagnoses

### Bacterial tracheitis:

- High fever
- Toxic appearance
- Poor response to epinephrine

### Epiglottitis:

- Sudden upset of high fever
- **Absence** of barking cough
- Dysphagia
- Drooling
- Anxious appearance
- Sitting forward; “sniffing position”



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## Severity Assessment

### Severity Assessment

Stridor at rest AND

one or more of the following:

- Prominent sternal wall retractions
- Tachypnea
- Agitation / restlessness / tired appearing
- Difficulty with talking or feeding

Upon presentation patient should be assessed for:

- Stridor at rest
- Retractions
- Tachypnea
- Mental status
- Ability to talk or feed

## Severity Assessment: Rationale

- There is no validated tool to assess croup severity in the clinical (non-research) setting
- To standardize care we need common language to discuss the severity of symptoms among patients
- Based on the Westley Croup Score (Westley 1978)

## Severity Assessment: Rationale

Focuses on specific symptoms that indicate a need for racemic epinephrine (moderate to severe symptoms):

Stridor at rest

AND

ONE OR MORE OF THE FOLLOWING:

- Prominent sternal wall retractions
- Tachypnea
- Agitated / restless / tired
- Difficulty with talking or feeding

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## Dexamethasone

### Give Dexamethasone (if not previously given)

- Dosage of 0.6mg/kg Dexamethasone
- Steroids are beneficial for all patients with croup

### Dexamethasone is recommended for ALL patients presenting with croup symptoms

#### FINDINGS:

- *Glucocorticoids are associated with an improved croup score at 6 hours (-1.2 points) and at 12 hours (-1.9 points); NNT for improvement = 5*
- *Fewer return visits in patients treated with glucocorticoids compared to placebo*
- *Length of hospital/ED stay was significantly decreased (mean decrease of 12 hours)*
- *Use of epinephrine is decreased*

[LOE: ★★☆☆, (Russell, 2011)]



## Dexamethasone Dosage

A dosage of 0.6 mg/kg of dexamethasone should be given

- Maximum dose of 16mg
- Round dose to nearest 2mg dosage

### Rationale:

*“In the absence of further evidence, a **single** oral dose of dexamethasone, probably 0.6mg/kg, should be preferred because of its safety, efficacy and cost effectiveness.”*

*Most of the studies that compared dexamethasone to placebo used the dosage of 0.6mg/kg (12 of 31 trials; N=2032)*

*There are small studies showing similar therapeutic effect at lower doses, more studies need to be done before changing the dosing recommendation.*

[LOE: ★★☆☆, (Russell, 2011)]



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## Glucocorticoid Choice

Comparisons between steroids: \_\_\_\_\_

- *Combination of dexamethasone + budesonide is no better than dexamethasone or budesonide alone*
- *No difference between PO and IM dexamethasone*
- *Dexamethasone and prednisolone are equally effective at 6 and 12 hours, but readmission is more likely with prednisolone*

[LOE: ★★★○, (Russell, 2011)]



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## Racemic Epinephrine (racepinephrine)

Racemic epinephrine works by causing mucosal vasoconstriction and reduction of subglottic edema

*Nebulized epinephrine is associated with clinically and statistically significant transient reduction of symptoms of croup at 30 minutes post-treatment.* (3 studies, 94 children)

*Evidence does not favor racemic epinephrine or L-epinephrine, or Intermittent Positive Pressure Breaths (IPPB) over simple nebulization.*

*Treatment effect disappears after two hours.*

*There is no evidence, on average, to suggest that there was an increase or worsening of croup score, as compared to the pre-treatment or baseline in the group treated with epinephrine.*

[LOE: ☆☆☆○, (Bjornson, 2011)]



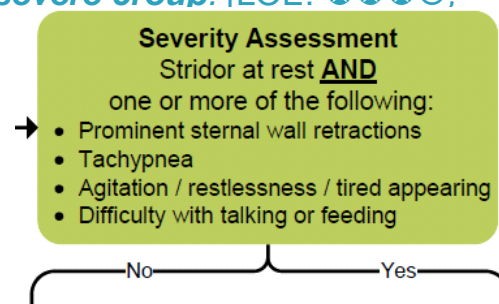
## Racemic Epinephrine: Who should receive it?

*Children with severe respiratory distress (indicated by marked sternal wall indwelling and agitation) [LOE: E (Expert Opinion), (Toward Optimized Practice, 2008)]*

*Children with severe or life threatening croup [LOE: E, (Mazza, 2008)]*

*Compared with placebo or no treatment nebulized adrenaline is more effective in the short-term at reducing symptom severity at 10-30 minutes in children with moderate to severe croup. [LOE: ☆☆☆○, (Johnson, 2004)]*

**Moderate/Severe =**



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## Racemic Epinephrine Administration

### MEDICATIONS:

Use racemic epinephrine for moderate or severe presentation (stridor at rest AND one or more of the following: prominent sternal wall retractions, tachypnea, agitation / restlessness / tired-appearing, difficulty with talking or feeding):

racpinephrine (racepinephrine 2.25% inhalation solution)

0.5 mL nebul

Note that racemic epinephrine is ordered under the name:

*racepinephrine*

*(racepinephrine 2.25% inhalation solution)*



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## Racemic Epinephrine: Inpatient Management

Racemic epinephrine can be given every 2 hours to patients who meet severity criteria

We recommend that patients be re-evaluated by MD if requiring more than one additional dose of racemic epinephrine after admission

Racemic epinephrine can be given more frequently than Q 2 hours, but should be done cautiously in conjunction with ongoing MD evaluation

### Give [Racemic Epinephrine](#)

Racemic epinephrine 2.25% inhalation solution (0.5 mL nebulized) diluted in 3 mL NS

Can give [racemic epinephrine Q2 hrs](#); more than 1 additional dose on medical unit requires MD evaluation

Racemic epinephrine can be ordered by the physician more frequently than Q2 hrs if the patient is worsening and MD bedside evaluation is in progress

### Give [Dexamethasone](#) (if not previously given )

Dosage of 0.6mg/kg Dexamethasone

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## Racemic Epinephrine: Observation in the Emergency Department

### Observation for 2 hr with minimum Q1 hour assessments

- Racepinephrine effect lasts only 2 hours
- If patient worsens, consider repeat racepinephrine and admission

*Treatment effect disappears after two hours.*

*There is no evidence, on average, to suggest that there was an increase or worsening of croup score, as compared to the pre-treatment or baseline in the group treated with epinephrine. [LOE: ☆☆☆○, (Bjornson, 2011)]*



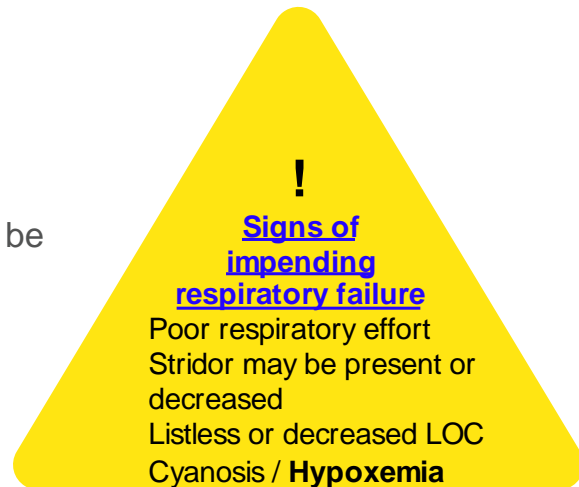
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## Other Cautions: Respiratory Failure!

*One in 4,500 children (1 in 170 hospitalized children) with croup are intubated*  
[LOE: E (Expert Opinion), (Toward Optimized Practice, 2008)]

**Hypoxemia** is uncommon in otherwise healthy children with croup and should be viewed as a warning sign of possible respiratory failure



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## Not Recommended: Cool Mist

### Cool Mist

- No evidence supporting the use of cool mist for treatment of croup

*3 studies of 135 patients demonstrates that the croup score of children managed in an emergency setting with mild to moderate croup does not improve greatly with inhalation of humidified air. (Moore, 2006)*

*There is no benefit and there is a risk of harm*

- *Risks of humidified air can include: scalds, mist tents can disperse molds and fungus and separate children from caregivers leading to increased agitation and worse symptoms [LOE: E (Expert Opinion), (CKS, 2008)]*

However, patients with croup may benefit from inhalation of cool night air in the home setting and this is still recommended



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## Not Recommended: Viral Testing

### Viral FA

- No evidence that laboratory tests improve croup care

*NP aspiration should not be undertaken in children with suspected croup [LOE: E, (Mazza, 2008)]*

*Lab and radiological assessment are not necessary to make the diagnosis of croup.*

- *The diagnosis of croup can be made based on the clinical presentation, history and physical exam. [LOE: E (Expert Opinion), (Toward Optimized Practice, 2008)]*



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## Not Recommended: Radiographs

### Radiographs

- No evidence that radiographs are necessary in croup with typical presentation that responds to therapy

Radiographs should not be used to diagnose croup [LOE: E, (Mazza, 2008)]

Imaging studies are not required in patients with typical history that respond to appropriate treatment

- Helpful in establishing an alternative diagnosis in patients with atypical disease [LOE: E (Expert Opinion), (Toward Optimized Practice, 2008)]

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## Discharge Criteria: Emergency Department

Study of children (n=527) admitted to hospital with stridor and/or sternal retractions at rest showed that only 1% of those who had resting stridor but no sternal retractions (N=305) had worsening respiratory distress after admission. (Wagner 1986)

*A child with croup who received adrenaline and steroids may be discharged after 3 hours observation if they are free of stridor and intercostal retractions at rest and are clinically well. [LOE: E, (Mazza, 2008)]*

*Criteria for ED discharge:*

- Presence of mild symptoms either on initial evaluation or after a period of observation*
- Children should not be discharged earlier than 2 hours after the administration of adrenaline*
- Parents should be able to return for care if symptoms worsen [LOE: E (Expert Opinion), (Toward Optimized Practice, 2008)]*



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## Admission Criteria

There is evidence that healthy children with mild croup do not need admission to the hospital

There is no evidence that stratifies the risks/benefits of whom to admit in the moderate category

There is consensus that patients with severe croup should be admitted

### Admit Criteria

- Patients with continued stridor at rest **AND** any symptoms listed in the severity assessment above
- Patients receiving 2 doses of racipinephrine
- Patients not otherwise meeting discharge criteria

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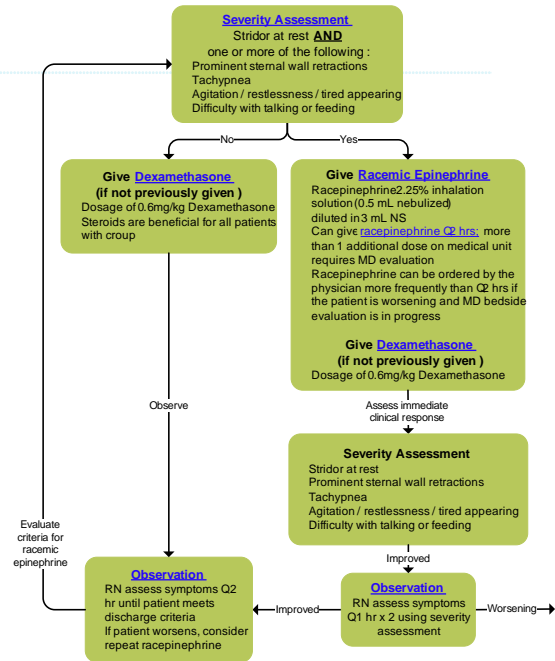
# Re-evaluation and Readiness for Discharge

RN will assess severity symptoms upon transfer to the medical unit

If racemic epinephrine given, observe patients hourly for 2 hours

Assess discharge readiness every 2 hours after arrival to floor

Patient can be discharged as soon as discharge criteria are met



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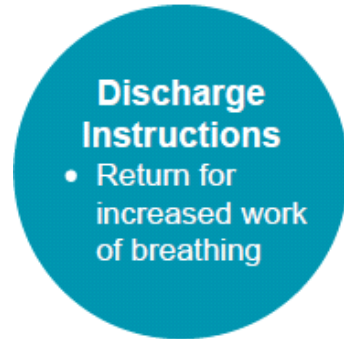
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# Discharge Instructions

For patients being discharged from the emergency room, discharge instructions will be provided from FirstNET

**Call your Primary Health-Care Provider or return to the Emergency Department if your child:**

- Breathing becomes more difficult or does not improve with moist air treatments and calming techniques as listed above
- Has stridor at rest when calm and is working hard to breathe
- Has trouble swallowing or is drooling a lot
- Is not able to take liquids
- Shows signs of dehydration:
  - dry mouth
  - no tears when crying
  - urinates less than 3 times in 24 hours
- Is too fussy or cannot be calmed
- Is too sleepy
- **Seems sicker**



**Call 9-1-1 if your child:**

- Is having a hard time breathing
- Lips or face look blue



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## Croup – December 2011 Executive Summary

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### Objective

To improve care for otherwise healthy children with croup in the emergency department and inpatient medical unit.

Additional objectives:

- To standardize the delivery of care
- To use dexamethasone for ALL patients with croup
- To deliver the first dose of inhaled racemic epinephrine in a timely manner
- To identify transfer criteria and discharge readiness in a timely manner
- To eliminate the use of non-proven modalities (e.g. cool mist, radiographs, viral testing)

### Recommendations

1. Give ALL patients ONE 0.6mg/kg dose of oral dexamethasone to a maximum dose of 16mg regardless of symptom severity
2. Use racemic epinephrine for moderate to severe croup defined as stridor at rest **AND** one or more of the following symptoms:
  - prominent sternal wall retractions
  - tachypnea
  - agitation/restlessness/tired appearing
  - difficulty with talking or feeding
3. Do **NOT** use cool mist in the emergency department or hospital setting
4. Do **NOT** routinely use viral testing
5. Do **NOT** routinely perform radiographs
6. Do **NOT** give additional steroids at discharge
7. Discharge patients that meet the following criteria
  - Minimal stridor at rest
  - Minimal retractions
  - Able to talk or feed without difficulty
  - 2 hours since racepinephrine
  - No supplemental oxygen for more than 12 hours
8. Patients with typical croup will not receive additional doses of steroids.

### Rationale

- Safety - Important safety alerts are imbedded in the algorithm and ordersets to identify patients at high risk of impending respiratory failure or serious alternative diagnoses.
- Quality of care will improve by:
  - Decreasing the time to racemic epinephrine which is a vital treatment for patients with croup and significant respiratory distress
  - Delineating specific times for re-evaluations for patients with croup
  - Having clear indications for racemic epinephrine and defined observation times.

## Croup – December 2011 Executive Summary

- Delivery of care will be improved by providing the emergency department with tools to expedite appropriate croup care.
- Engagement is grounded in the fact that the pathway has been developed by RNs, RTs, and MDs. All involved groups in the emergency department and inpatient unit had multiple opportunities during its development to provide feedback and suggestions.
- Patient/Family Satisfaction will be addressed by implementing clinical standard work that will assure the highest quality of care. This work makes it clear to families what the discharge criteria are and provides guidelines for safe discharge as early as possible.
- Costs will be reduced by eliminating the use of unnecessary testing and prolonged hospitalization.

### Evidence

We initially performed a filtered search of the literature that included systematic reviews, meta-analyses, and published guidelines from 1996-2011. This search yielded 99 publications which were reviewed by title and abstract and reduced to 50 pertinent publications. The full text of each of these 50 publications were reviewed by one physician and one nurse and categorized by type and by clinical question addressed. Three guidelines were identified which were then evaluated using the AGREE II tool to determine the quality of the guidelines. All three were reviewed independently by 4 reviewers and accepted for use with modifications.

The three guidelines were:

- **Diagnosis and management of croup.(2008). Toward Optimized Practice (Referred to as “Alberta”)** - developed by an Alberta Clinical Practice Working Group as part of the Alberta Medical Association in Alberta, Canada.
- **Croup.(2008). CKS (Formerly PRODIGY) (Referred to as “CKS”)** - published BY CKS, which was initially commissioned by the National Institute for Health and Clinical Excellence (NICE) in Great Britain.
- **Mazza, D., Wilkinson, F., Turner, T., Harris, C., & Health for Kids Guideline Development, Group. (2008). Evidence based guideline for the management of croup. Australian Family Physician, 37(6 Spec No), 14-20. (Referred to as “Australia”)** - developed by the Health for Kids Guideline Development Group in Australia and is endorsed by the Royal Australian College of General Practitioners.

Additionally we reviewed the comprehensive Cochrane reviews below:

- Russell KF, Liang Y, O’Gorman K, Johnson DW, Klassen TP. (2011) Glucocorticoids for croup. *Cochrane Database of Systematic Reviews*, 1, 001955.
- Bjornson, C., Russell, K.F., Vandermeer, B., Durec, T. Klassen, T.P., & Johnson, D.W. (2011). Nebulized epinephrine for croup in Children. *Cochrane Database of Systemic Reviews*, 2, 006619.

Additional citations are listed at the end of the learning module.

## Croup – December 2011 Executive Summary

### Implementation Items

- Created two algorithms: one for inpatient and one for the Emergency Department for the management of croup.
- Created a Learning Center training module with test questions for the management of croup
- Developed two ordersets: ED Croup Orderset and Croup Admit Orderset
- Refined ED discharge instructions to provide more safety and treatment education for families

### Metrics Plan

1. Monitor the number of ED and inpatient discharges with croup diagnosis. (every 3-6 mo)
2. Inpatient median length of stay (every 3-6 mo)
3. Pathway/orderset usage rate as a percentage of croup discharges (every 3-6 mo)
4. Percentage of patients with discharge diagnosis of croup receiving dexamethasone (every 3-6 mo)
5. Median time to first dose of racemic epinephrine in the emergency department. (every 3-6 mo)
6. Readmission within 2 days of discharge from ED or inpatient unit (monthly)
7. Monitor the number of additional tests (XR, respiratory FA) for patients whose discharge diagnosis is croup. (every 3-6mo)

### PDCA Plan

The CSW owner and committee will follow metrics, continue to review medical literature, and make alterations to the pathway as needed.

### Revision History

Date Approved:

Revision Date:

# Self-Assessment

- If you are taking this self-assessment as a part of required departmental training, you will need to logon to the [Learning Center](#) to receive credit. Completion also qualifies you for 1 hour of Category II CME credit.

1. The croup pathway is designed for patients:
  - a. 6 months to 6 years old
  - b. With croup that are otherwise healthy
  - c. With an upper airway abnormality
  - d. With hypotonia
  - e. Both a and b
2. Symptoms of croup usually include all of the following EXCEPT:
  - a. Fever
  - b. Wheezing
  - c. Inspiratory stridor
  - d. Respiratory distress
  - e. Barky cough
3. True or False: A patient presenting with high fever, toxic appearance, and drooling should be placed immediately on the croup pathway.
4. Which of the following patients with suspected croup should receive dexamethasone?
  - a. A patient with inspiratory stridor audible with agitation
  - b. A patient with a barky cough and no respiratory distress
  - c. A patient with inspiratory stridor at rest, significant tachypnea, and retractions
  - d. All of the above
5. Which of the following patients with suspected croup should receive racemic epinephrine(racepinephrine)?
  - a. A patient with inspiratory stridor at rest and significant retractions
  - b. A patient with inspiratory stridor at rest, who has no other evidence of increased work of breathing
  - c. A patient with inspiratory stridor at rest and agitation/restlessness
  - d. Answers a and c
  - e. Answers a, b, and c
6. After giving a patient racemic epinephrine (racepinephrine) for croup the patient \_\_\_\_\_
  - a. Should be reassessed in one hour
  - b. Can be discharged home
  - c. Needs to be observed for at least 4 hours
  - d. Should be admitted to the hospital if they are in the emergency department
  - e. None of the above
7. True or False: Hypoxemia is a common presenting feature of croup?
8. All patients with suspected croup should get:
  - a. Cool mist treatment
  - b. A viral FA
  - c. Lateral neck soft tissue X-ray
  - d. Chest X-ray
  - e. None of the above
9. True or false: A patient that is admitted and receives epinephrine on the inpatient unit needs a re-evaluation immediately after the treatment and then Q1 hour x2.
10. The discharge criteria include all of the following EXCEPT:
  - a. No stridor
  - b. Minimal retractions
  - c. Able to talk or feed without difficulty
  - d. 2 hours since racepinephrine
  - e. No supplemental oxygen for more than 12 hours

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# Answer Key

## ANSWER KEY

1. Answer: e. Inclusion criteria for the croup pathway are: age 6 mo to 6 years and previously healthy. Exclusion criteria include patients with upper airway abnormalities, toxic appearance, symptoms suggestive of an alternative diagnosis, hypotonia, and neuromuscular disorders.
2. Answer: b. Croup is generally characterized by barking cough, inspiratory stridor, hoarse voice, respiratory distress, fever, URI symptoms. Wheezing is not a sign of croup and suggests an alternative diagnosis.
3. Answer: FALSE. These are symptoms of epiglottitis. A bacterial illness that can be life threatening and requires prompt recognition and treatment. Patients with croup generally have low grade fevers, do not appear toxic, and are not drooling.
4. Answer: d. All patients with croup should receive a dose of steroids.
5. Answer: d. The decision to give racemic epinephrine is based on a severity assessment that includes stridor at rest and one or more of the following: prominent retractions, significant tachypnea, agitation/restlessness/tired appearing, difficulty with talking or feeding. Inspiratory stridor at rest without other signs of significant respiratory distress does not necessitate racemic epinephrine, observation is appropriate.
6. Answer: e. A patient receiving racemic epinephrine should be reassessed immediately after for response, must be observed for at least 2 hours and thus can not be discharged home immediately. A patient receiving racemic epinephrine does not necessarily need to be admitted.
7. Answer: False. Hypoxemia is VERY UNCOMMON in croup and signifies impending respiratory failure or a serious alternative diagnosis.
8. Answer: e. None of the above therapies are recommended for typical patients with croup meeting the inclusion criteria for the croup pathway.
9. Answer: True. After two hours of Q1 reassessments the patient can go to Q2 assessments until meeting discharge criteria. The patient can be discharged whenever discharge criteria are met.
10. Answer: a. Stridor with activity is to be expected in patients with croup. Patients with minimal stridor at rest that has remained stable and who don't show other significant signs of respiratory distress can be discharged home.

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# Evidence Ratings

We used the GRADE method of rating evidence quality. Evidence is first assessed as to whether it is from randomized trial, or observational studies. The rating is then adjusted in the following manner:

Quality ratings are *downgraded* if studies:

- Have serious limitations
- Have inconsistent results
- If evidence does not directly address clinical questions
- If estimates are imprecise OR
- If it is felt that there is substantial publication bias

Quality ratings can be *upgraded* if it is felt that:

- The effect size is large
- If studies are designed in a way that confounding would likely underreport the magnitude of the effect OR
- If a dose-response gradient is evident

## Quality of Evidence:

★★★★ High quality

★★★○ Moderate quality

★★○○ Low quality

★○○○ Very low quality

Expert Opinion (E)

Reference: Guyatt G et al. J Clin Epi 2011:383-394

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# Bibliography

## Guidelines and Reviews

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# Summary of Version Changes

- **Version 1 (12/19/2011):** Go live

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