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Clinical Practice Guidelines

Quality Improvement and Clinical Safety

2-2016

Croup

Children's Mercy Kansas City

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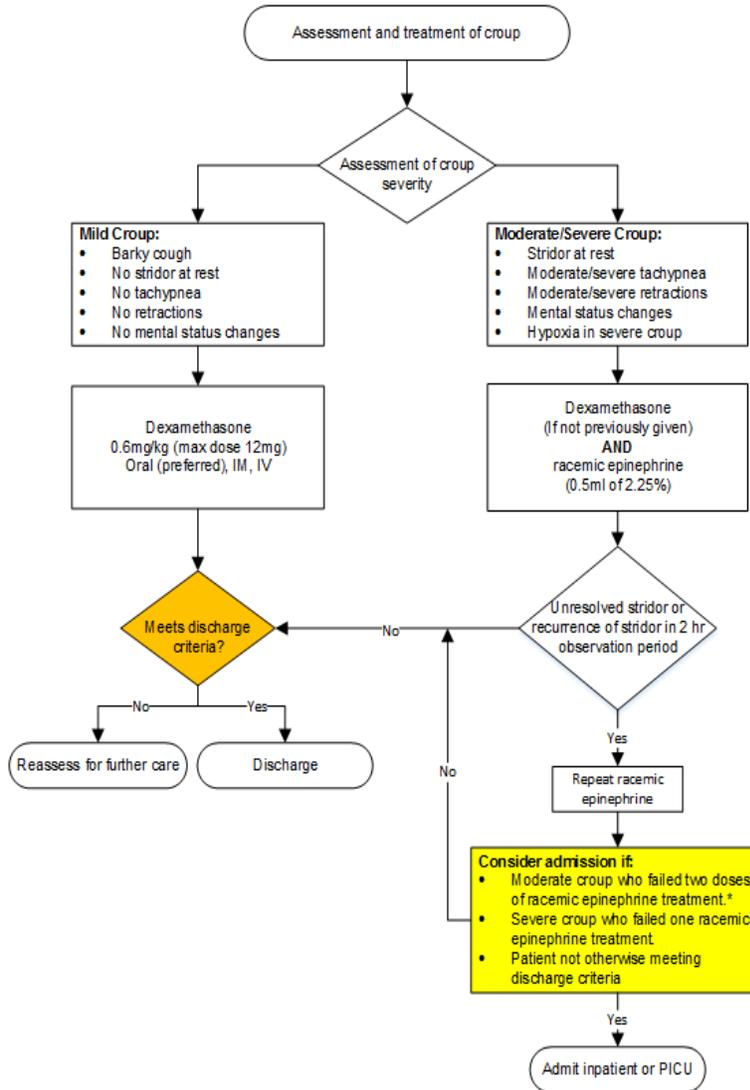
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These guidelines do not establish a standard of care to be followed in every case. It is recognized that each case is different and those individuals involved in providing health care are expected to use their judgment in determining what is in the best interests of the patient based on the circumstances existing at the time. It is impossible to anticipate all possible situations that may exist and to prepare guidelines for each. Accordingly, these guidelines should guide care with the understanding that departures from them may be required at times.

**Children's Mercy Hospitals and Clinics
Evidence Based Practice Clinical Practice Guide**

Outpatient Croup

- Inclusion Criteria:**
- Age 6 months to 6 years
 - Principal diagnosis of croup
- Exclusion Criteria:**
- Toxic appearance
 - Symptoms suggestive of an alternative diagnosis.
 - Known upper airway abnormality
 - Hypotonia or neuromuscular disorder
 - Complex medical comorbidities
- Not Routinely Recommended**
- Cool mist
 - X-ray
 - ENT consult
 - Viral testing
 - Repeat dexamethasone
- Discharge Criteria**
- No stridor at rest, tachypnea, intercostal retractions or other signs of increased work of breathing.
 - Received one dose of dexamethasone and has been observed for at least 2 hours if racemic epinephrine has been administered.
 - No other indications for hospitalization.
 - The patient is able to return to the ED/UCC if symptoms return.



- Signs of impending respiratory failure**
- Poor respiratory effort
 - Severe retractions
 - Poor response to racemic epinephrine
 - Lethargic or decreased LOC
 - Cyanosis/Hypoxemia

- Children who appear ill or toxic and/or do not respond to racemic epinephrine may have alternative diagnosis:**
- Bacterial tracheitis
 - Epiglottitis
 - Retropharyngeal abscess
 - Foreign body
 - Allergic reaction

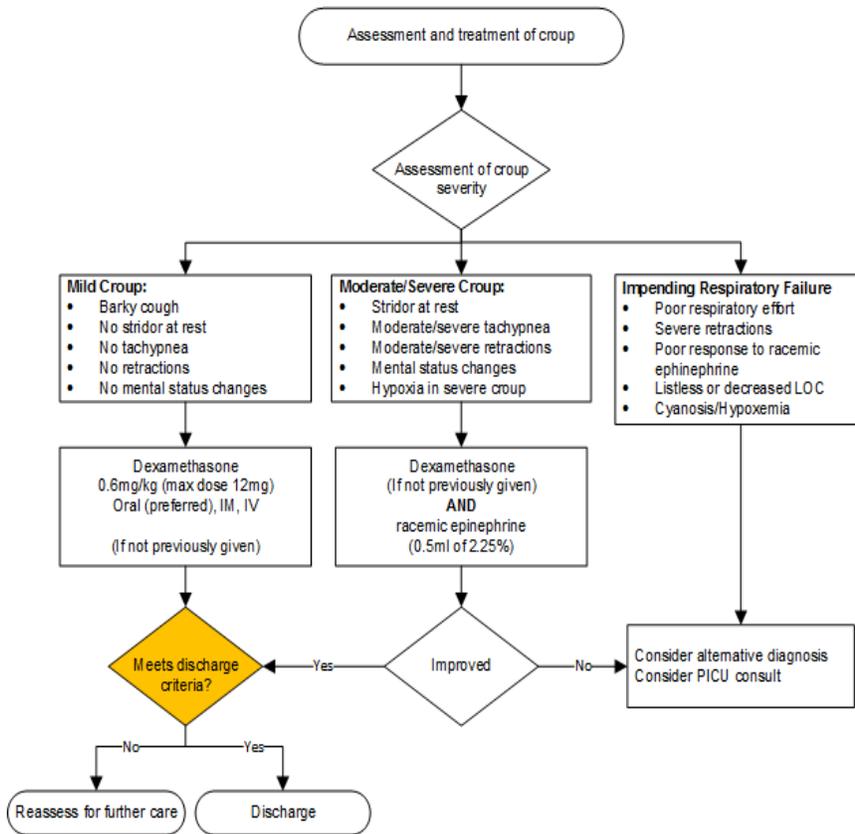
*Current data does not clearly identify admission needs for moderate croup patients, who have no stridor after 2 racemic epinephrine.

Inpatient Croup

- Inclusion Criteria:**
- Age 6 months to 6 years
 - Principal diagnosis of croup
- Exclusion Criteria:**
- Toxic appearance
 - Symptoms suggestive of an alternative diagnosis.
 - Known upper airway abnormality
 - Hypotonia or neuromuscular disorder
 - Complex medical co-morbidities

- Not Routinely Recommended:**
- Cool mist
 - X-ray
 - ENT consult
 - Viral testing
 - Repeat dexamethasone

- Discharge Criteria:**
- >2hours since last racemic epinephrine
 - No stridor at rest, tachypnea, intercostal retractions or other signs of increased work of breathing.
 - Able to talk or feed without difficulty
 - The patient is able to return to the ED/UCC if symptoms return.



- Children who appear ill or toxic and/or do not respond to racemic epinephrine may have alternative diagnosis:**
- Bacterial tracheitis
 - Epiglottitis
 - Retropharyngeal abscess
 - Foreign body
 - Allergic reaction

Epidemiology:

Croup affects:

- Children < 6 years old
- The peak incidence is at ages 6-36 months
- It is one and a half times more common in boys than girls
- It is uncommon in adolescents and infants < 3 months old.
- It is rare in adults.

The prevalence of croup occurs in about 5% of children between ages 12 and 24 months and is most prevalent in fall and early winter. Risk factors include upper respiratory infection (URI), especially parainfluenza virus infection, age < 6 years, especially ages 6-36 months, and inadequate immunization. Family history is a risk factor for croup (Woods, 2015).

Definition:

- Croup is a common childhood respiratory illness characterized by barking cough, often accompanied by inspiratory stridor, hoarseness, and respiratory distress.
- Croup is usually associated with viral infection (Woods, 2015).

Objective of Guideline: The objective of this guideline is to standardize and improve care for otherwise healthy children diagnosed with croup in the Emergency Departments(ED)/Urgent Care Centers (UCC), outpatient settings, and inpatient medical units.

Target Users: Physicians, nurse practitioners, and staff nurses caring for children with croup in EDs, UCCs, outpatient settings, and inpatient settings.

Guideline Inclusion Criteria:

Previously healthy patients (ages 6 months to 6 years) with the clinical presentation consistent with the diagnosis of croup.

Guideline Exclusion Criteria:

- Toxic appearance
- Complex medical co-morbidities
- Hypotonia or neuromuscular disease
- Symptoms suggestive of an alternative diagnosis: (a) expiratory wheeze, (b) drooling or difficulty swallowing, (c) prolonged or recurrent stridor, (d) poor response to treatment
- Known airway abnormalities: (a) vocal cord paralysis, (b) subglottic stenosis, (c) tracheomalacia, (d) laryngomalacia, (e) history of vascular ring or tracheoesophageal fistula

Clinical Questions Answered by Guideline:

1. In children with croup, is prednisolone as efficacious as dexamethasone to resolve symptoms?
2. In children with croup, what is the recommended dose, frequency, and route of administration (oral vs. IM) of dexamethasone and prednisolone?
3. In children with croup, how long should observation be post racemic epinephrine dose and is there a rebound effect?
4. In children with croup, what are the criteria for admission?
5. In children with croup, are x-rays needed in the management of croup?
6. In children with croup, when is an ENT consultation necessary?

7. Are there valid and reliable croup scores to classify children with croup?

Practice Recommendations:

1. Evaluation

- a. The definition of croup severity was determined from existing guidelines (Seattle Children's Hospital (2012), Children's Hospital of Philadelphia (2014), Children's Hospital of Colorado (2011)) and expert opinion.
 - i. Mild croup is defined as barky cough, no stridor at rest, no tachypnea, no retractions, and no mental status changes.
 - ii. Moderate croup is defined as stridor at rest, mild tachypnea, mild retractions, and no mental status changes.
 - iii. Severe croup is defined as stridor at rest, severe tachypnea, severe retractions, mental status changes, and/or hypoxia.

- b. Croup scores
 - i. There is no validated tool to assess croup severity in the clinical setting.
 - ii. The Westley Croup Score is the most commonly referenced scoring tool for croup severity (Westley, Cotton, & Brooks, 1978). The original study measured the clinical response of nebulized racemic epinephrine versus saline. It didn't aim to create a prognostic scoring system.

2. Ambulatory Treatment Settings

- a. Mild Croup: Glucocorticosteroids are recommended for mild croup. Dexamethasone is the first line glucocorticoid therapy for croup (Russell et al., 2011).
 - i. Dexamethasone 0.6mg/kg (max dose 12mg) given once orally or intramuscularly.
 1. There are some small studies showing that a dexamethasone dose of 0.15mg/kg may be as effective as a dose of 0.6mg/kg (Russell, Liang, O'Gorman, Johnson, & Klassen, 2011).
 2. Only one dose of dexamethasone is recommended based on expert opinion.
 - a. There are no RCTs comparing single dose versus multiple dose dexamethasone for croup.
 3. There is no difference in PO versus IM dexamethasone (Russell et al., 2011).
 - ii. Prednisolone 2mg/kg/day for 3 days.
 1. Multi-dose prednisolone is just as efficacious as dexamethasone. Based on a few small studies, there may be increased readmission rate with prednisolone (Russell et al., 2011). Although, these studies compared single dose dexamethasone vs. a single dose prednisolone. Garbutt et al. (2013) showed no difference in readmission rate when a single dose dexamethasone is compared to multiple doses of prednisolone.
 - iii. There is no evidence that a combination of dexamethasone and prednisolone improve croup (Russell et al., 2011).

- b. Moderate/Severe Croup:
 - i. All patients should get dexamethasone 0.6mg/kg (max dose 12mg) given once orally or intramuscularly if not previously given.
 - ii. Racemic epinephrine (0.5ml of 2.25%)
 1. There is no evidence of a rebound effect resulting in increase in croup severity with racemic epinephrine treatment (Bjornson et al., 2011).

2. Repeat racemic epinephrine dose if a poor response to the first treatment or respiratory symptoms recur after an initial good response (Bjornson et al., 2011).
3. Discharge from Ambulatory Setting
 - a. Discharge criteria were developed based on expert opinion.
 - b. No stridor at rest, tachypnea, intercostal retractions, or other signs of increased work of breathing.
 - c. Received one dose of dexamethasone.
 - d. Observed for at least 2 hours if racemic epinephrine has been administered.
 - e. No other indications for hospitalization.
 - f. The patient is able to return to the ED/UCC if symptoms return.
4. Admission
 - a. Admission criteria were developed based on expert opinion and guideline review.
 - b. Absolute Admission:
 - i. Moderate croup: failed two doses of racemic epinephrine treatment.
 - ii. Severe croup: failed one racemic epinephrine treatment.
 - iii. Patient not otherwise meeting discharge criteria.
 - c. Relative Admission:
 - i. Inadequate access to medical care (lives long distance from hospital, transportation barriers) and concerns for inadequate observation at home or follow-up.
 - ii. Significant parental anxiety.
 - iii. Recurrent ED visit within 24hours.
5. Inpatient
 - a. All patients should get dexamethasone 0.6mg/kg (max dose 12mg) given once orally or intramuscularly, if not previously given. Racemic epinephrine should be given PRN.
 - b. Oxygen is indicated for cyanosis, hypoxia (oxygen saturation < 90% on room air), or respiratory distress.
 - c. Signs of impending respiratory failure: (a) poor respiratory effort, (b) severe retractions, (c) poor response to racemic epinephrine, (d) listless or decreased level of consciousness, (e) cyanosis/hypoxemia.
 - d. Consider bacterial tracheitis, epiglottitis, or retropharyngeal abscess in children who appear toxic, either before or after racemic epinephrine.
 - e. Children who do not respond to racemic epinephrine may have an alternative diagnosis and need further workup.
 - i. Other diagnosis: (a) bacterial tracheitis, (b) retropharyngeal abscess, (c) allergic reaction, (d) foreign body, (e) epiglottitis.
 - f. Consider emergent airway management and ENT consultation if the patient is still having stridor at rest after 3 or more doses of racemic epinephrine.
 - g. Consider heliox for patients needing repeat doses of racemic epinephrine (Moraa, Sturman, McGuire, & van Driel, 2013).
6. Inpatient Discharge Criteria
 - a. > 2hours since last racemic epinephrine.
 - b. No stridor at rest, tachypnea, intercostal retractions, or other signs of increased work of breathing.
 - c. Able to talk and feed without difficulty.
 - d. The patient is able to return to the ED/UCC if symptoms return.

1. Not Routinely Recommended based on expert opinion.
 - a. Humidified air.
 - i. There is no RCT evidence that supports the use of humidified air (Johnson, 2014).
 - b. X-ray
 - i. There is no evidence that radiographs are necessary in a typical presentation of croup that responds to therapy. Consider for suspected alternative diagnosis.
 - c. ENT consult
 - i. There is no evidence that an ENT consult is necessary in a typical presentation of croup that responds to therapy. Consider for suspected alternative diagnosis.
 - d. Viral testing
 - i. There is no evidence that laboratory testing improves croup outcomes. Consider for suspected alternative diagnosis.

Outcome Measures:

- Number of admissions with primary croup diagnosis.
- Length of stay for the hospitalized patient.
- X-rays ordered with primary diagnosis of croup.
- Number of doses of racemic epinephrine per patient with primary diagnosis of croup
- Steroids given (prednisolone versus dexamethasone vs both)
- Prescriptions

Potential Cost Implications:

- Patient savings related to a decrease in x-rays, ENT consults, and medications given or prescribed.
- Decreased admissions.

Guideline Preparation: This guideline was prepared by The Office of Evidence Based Practice (EBP) in collaboration with content experts at Children's Mercy Hospitals and Clinics. Development of this guideline supports the Department of Clinical Effectiveness's initiative to promote care standardization that builds a culture of quality and safety that is evidenced by measured outcomes. If a conflict of interest is identified the conflict will be disclosed next to the team members name.

Croup Team Members:

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Office of EBP Team Members responsible for reviewing, synthesizing, and developing the synopsis and the specific care questions were:

- Jeffrey Michael, D.O., FAAP, EBP Medical Director
- Jarrod Dusin, MS, RD, LD, CNSC Team Facilitator
- Jacqueline A. Bartlett, PhD, RN, EBP Director

- Nancy Allen, MS, MLS, RD, LD, EBP Program Manager

Guideline development funded by: Departmental funding

Development Process:

We initially performed a filtered search of the literature that included systematic reviews, meta-analyses, and published guidelines. Twenty guidelines were evaluated using the AGREE tool to determine quality of the guidelines. Three guidelines ("Croup Clinical Care Guideline: Age 6 Months to 3 Years," 2011; "Croup v.1.1: ED Management, Inpatient Management," 2012; "ED Pathway for the Evaluation/Treatment of the Child with Croup," 2014) were selected based on their AGREE score and were used as our development guides with modifications. Four Cochrane meta-analysis and systematic reviews (Bjornson et al., 2011; Moore & Little, 2006; Moraa et al., 2013; Russell et al., 2011) were also included in the development of this guideline. A further literature search was performed to look for any new research on the subject of our questions.

The review summary documents the following steps:

1. Review of existing internal and external guidelines and standards
External guidelines: Croup (2012). Seattle Children's Hospital.
Croup (2014). Children's Hospital of Philadelphia.
Croup (2011). Children's Hospital of Colorado.
2. Review preparation
 - a. PICOT questions established
 - b. Team leaders confirmed search terms used
3. Databases searched
 - a. AHRQ National Guideline Clearinghouse
 - b. Medline
 - c. Cochrane
 - d. CINAHL
4. Critically analyze the evidence
 - a. Guidelines
 - i. AGREE criteria were used to analyze published clinical guidelines
 - b. Literature
 - i. GRADE criteria evaluated the literature based on:
 1. The balance between desirable and undesirable effects
 2. Patient values and preferences
 3. Resource utilization

The table below defines how the quality of the evidence is rated and how the recommendation is established based on the type of evidence:

Quality	Type of Evidence
High	Consistent evidence from well-performed RCTs or exceptionally strong evidence from unbiased observational studies.
Moderate	Evidence from RCTs with important limitations (inconsistent results, methodological flaws, indirect evidence, or imprecise results) or unusually strong evidence from unbiased observational studies.
Low	Evidence for at least 1 critical outcome from observational studies, from RCTs with serious flaws or indirect evidence.
Very Low	Evidence for at least 1 of the critical outcomes from unsystematic clinical observations or very indirect evidence.
Recommendation	Type of Evidence
Strong	Desirable effects clearly outweigh undesirable effects or vice versa
Weak	Desirable effects closely balanced with undesirable effects

- Recommendations for the guideline were developed by a consensus process incorporating the three principles of EBP (current literature, content experts, and patient and family preference [when possible])

Approval Process: Guidelines are reviewed and approved by an internal reviewer, Tiffany Addington MD, external reviewer, Erika Sidney MD (Children's Hospital Colorado), Content Expert Team, the Office of EBP, and other appropriate hospital committees as deemed suitable for the guidelines intended use. Guidelines are reviewed and updated as necessary every 3 years within the Office of EBP at CMH&C. Content expert teams will be involved with every review and update.

Disclaimer: When evidence is lacking or inconclusive, options in care are provided in the guideline and the power plans that accompany the guideline.

These guidelines do not establish a standard of care to be followed in every case. It is recognized that each case is different and those individuals involved in providing health care are expected to use their judgment in determining what is in the best interests of the patient based on the circumstances existing at the time.

It is impossible to anticipate all possible situations that may exist and to prepare guidelines for each. Accordingly these guidelines should guide care with the understanding that departures from them may be required at times.

Question: (1) In children with croup, is prednisolone as efficacious as dexamethasone in treatment?

Question Originator: Croup Clinical Practice Guideline Work Group.

Croup CPG Team Recommendations: Multi-dose prednisolone is just as efficacious as dexamethasone. Based on a few small studies from a Cochrane meta-analysis, there may be increased readmission rate with prednisolone; although, these studies compared single dose dexamethasone vs. a single dose prednisolone (Russell et al., 2011). Garbutt (2013) showed no difference in readmission rate when a single dose dexamethasone is compared to multiple doses of prednisolone. This statement is in agreement with the guidelines we reviewed.

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Search Strategy and Results:

Search: ("Croup"[Mesh] OR croup OR "Parainfluenza Virus 2, Human"[Mesh] OR laryngotracheobronchitis OR laryngotracheitis) AND (((("Prednisolone"[Mesh] OR prednisolone OR prednisone) AND ("Dexamethasone"[Mesh] OR dexamethasone OR decadron OR oradexon OR efficac* OR effectiv*)) OR glucocorticoid* OR "Glucocorticoids"[Mesh] OR corticosteroid*) Filters: From 2010/01/01

Guidelines and studies included in this review:

Croup (2012). Seattle Children's Hospital

Croup (2014) Children's Hospital of Philadelphia

Croup (2011) Children's Hospital of Colorado

Russell, 2011

Garburtt, 2013

Guidelines and studies not included in this review with rationale for exclusion:

Nottingham Children's Hospital 2012 – Recommended unavailable medications

Petrocheilou 2014 – Review article

Method Used for Appraisal and Synthesis:

AGREE II was used to evaluate the included Guidelines. The Cochrane Collaborative computer program, Review Manager (RevMan 5.3).

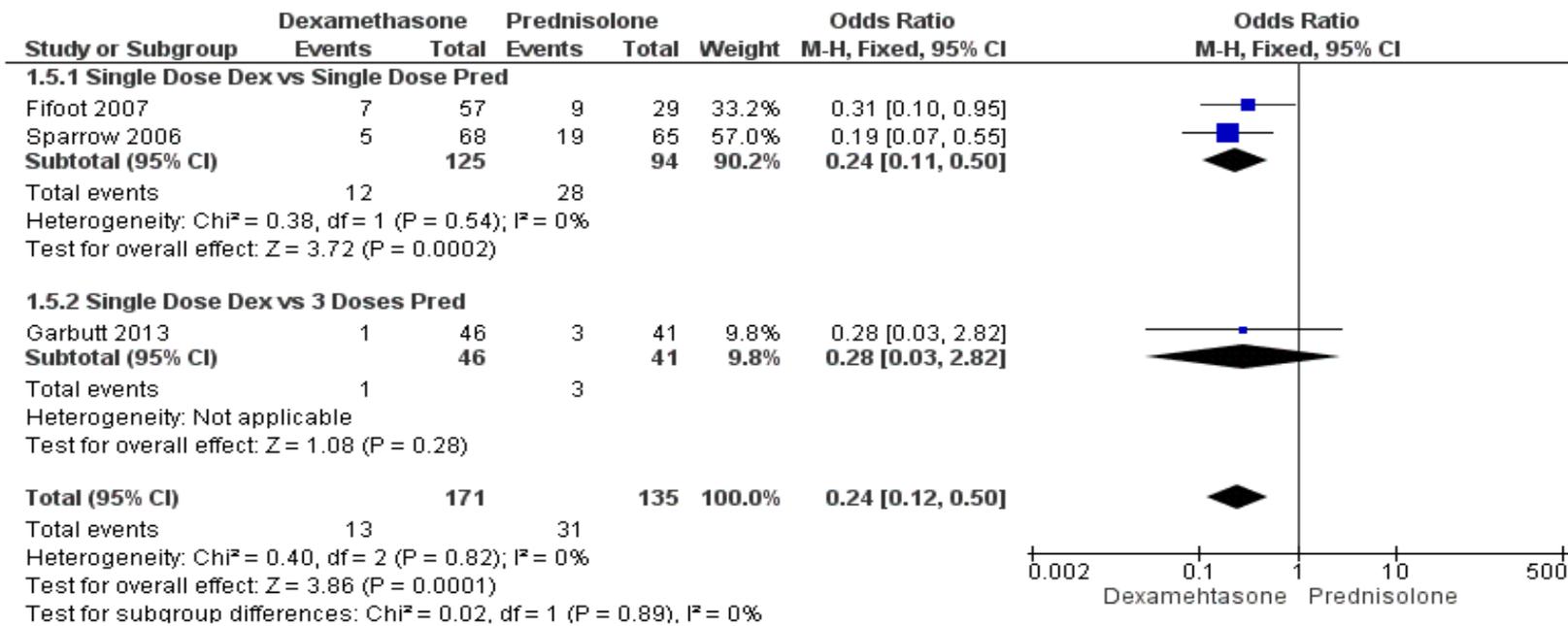
Garbutt 2013

Methods	RCT
Participants	<p>Setting: 10 pediatric offices of PCPs in the St. Louis, Missouri area</p> <p>Randomized: Treatment group (prednisolone n= 41), Control group (dexamethasone n=46)</p> <p>Age: Prednisolone group: 2.67±1.43, Dexamethasone group: 3.11±1.58</p> <p>Completed: 40 completed for prednisolone and 45 completed for dexamethasone</p> <p>Gender: Prednisolone group: 28 (61%) male/Dexamethasone group: 28 (68%) male.</p> <p>Inclusion criteria: Children 1-8 years of age with croup symptoms for less than or equal to 48 hours with a clinical diagnosis of mild or moderate croup at a participating site.</p> <p>Exclusion criteria: Patients were excluded if they were diagnosed with severe croup or impending respiratory failure by the PCP; or had prior treatment with epinephrine or oral corticosteroids for this croup episode; or symptoms or signs suggesting another cause of stridor; or chronic respiratory disease including asthma; or a known contraindication to systemic steroid use. Also excluded were children if parent in attendance would not be in the same household as the child for the subsequent 4 days, could not participate in telephone follow-up interviews, or was not English speaking.</p> <p>Power analysis: A target sample of 100 patients per group was determined to be needed to estimate event rates and the width of the 95% confidence interval. Adequate prior information to estimate the need for additional health care in the prednisolone group and, therefore, to calculate statistical power, was not available. All analysis adhered to the intention-to-treat principle, and a probability of P < .05 was used to establish statistical significance.</p>
Interventions	<p>Prednisolone group: 2 mg/kg (maximum 60 mg/d) once a day for 3 days</p> <p>Dexamethasone group: 0.6 mg/kg (maximum 18mg) followed by 2 days of placebo comparable in appearance, smell, and taste</p>
Outcomes	<p>There was no difference in the 2 groups in reported additional healthcare for croup in the 11 days following the index visit (prednisolone, 7%, 95% CI= 1.5% to 19.9%; Dexamethasone, 2%, 95% CI=0.0% to 11.5%; P=.34)</p>

Risk of bias table

Bias	Scholar Judgment	Support for judgment
Random sequence generation (selection bias)	Low Risk	Computer-generated random numbers determined how the two treatments were allocated to the consecutively numbered study drug packages at each site. Randomized blocks were used to assign subjects to treatment groups, with randomization stratified by site.
Allocation concealment (selection bias)	Low Risk	The drug formulation (completed by licensed pharmacist in another state) ensured the volume of the weight-based dose was equivalent for each medication
Blinding of participants and personnel (performance bias)	Low Risk	Due to outside licensed pharmacist mixing drug and computer generated allocation of drugs, blinding of participants and personnel was ensured.
Blinding of outcome assessment (detection bias)	Low Risk	Blinding of outcome assessment ensured, and unlikely that the blinding could have been broken.
Incomplete outcome data (attrition bias)	Low Risk	Plausible effect size among missing outcomes not enough to have a clinically relevant impact on observed effect size (both groups lost one participant in follow-up).
Selective reporting (reporting bias)	Low Risk	All study protocol is available and all of the study's pre-specified outcomes have been reported in a pre-specified way.
Other bias	Unclear Risk	Drug mixing involved 2mg/kg of prednisolone and 0.6mg/kg of dexamethasone. It is unclear and not included in document how this was completed to blind study personnel as the physician had to draw the correct dose per child's weight in the office and then also prepare correct dose for parent to administer at home.

Figure 1: Dexamethasone versus Prednisolone, Outcome Return visits and /or (re)admissions by inpatient/outpatient.



*Figure recreated using Russell (2011).

Question: (2) In children with croup, what is the recommended dose, frequency, and route of administration (oral vs. IM) of dexamethasone and prednisolone?

Question Originator: Croup Clinical Practice Guideline Work Group.

Croup CPG Team Recommendations: Based on very poor evidence from a Cochrane meta-analysis, there is no difference in PO and IM dexamethasone (Russell, 2011). There are a few small studies showing that a dexamethasone dose of 0.15mg/kg may be as effective as a dose of 0.6mg/kg (Russell, 2011). Only one dose of dexamethasone is recommended based on expert opinion. There are no RCTs comparing single dose versus multiple dose dexamethasone for croup. This statement is in agreement with the guidelines we reviewed.

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Search Strategy and Results: ("Croup"[Mesh] OR croup OR "Parainfluenza Virus 2, Human"[Mesh] OR laryngotracheobronchitis OR laryngotracheitis) AND ("Prednisolone/administration and dosage"[Mesh] OR "Dexamethasone/administration and dosage"[Mesh] OR "Glucocorticoids/administration and dosage"[Mesh] OR ((dexamethasone OR decadron OR oradexon OR prednisolone OR prednisone OR glucocorticoid* OR corticosteroid*)) AND (dose OR dosage OR administration OR oral OR intramuscular))) Filters: From 2010/01/01

Guidelines and studies included in this review:

Croup (2012). Seattle Children's Hospital

Croup (2014) Children's Hospital of Philadelphia

Croup (2011) Children's Hospital of Colorado.

Russel 2011

Guidelines and studies not included in this review with rationale for exclusion:

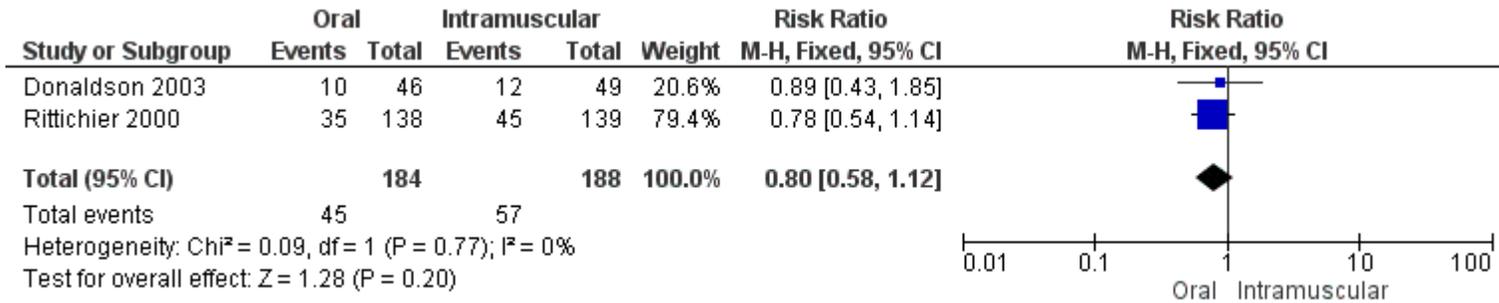
Nottingham Children's Hospital 2012 – recommended unavailable medications.

Dobrovoliac 2012 , The study only looked at croup score for 15mg/kg oral dexamethasone.

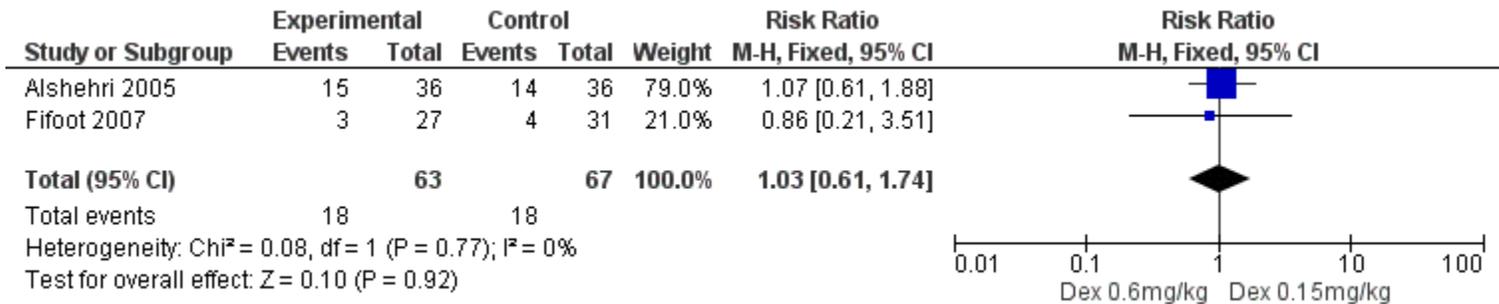
Petrocheilou 2014, Review article.

Method Used for Appraisal and Synthesis:

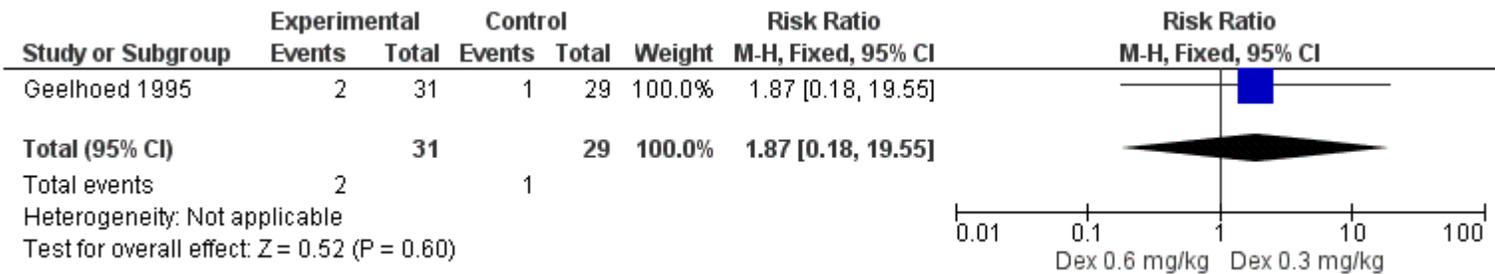
AGREE was used to evaluate the included Guidelines. The Cochrane Collaborative computer program, Review Manager (RevMan 5.3).

Figure 2. Comparison Oral versus intramuscular dexamethasone, Outcome Return visits and /or (re)admissions by inpatient/outpatient.


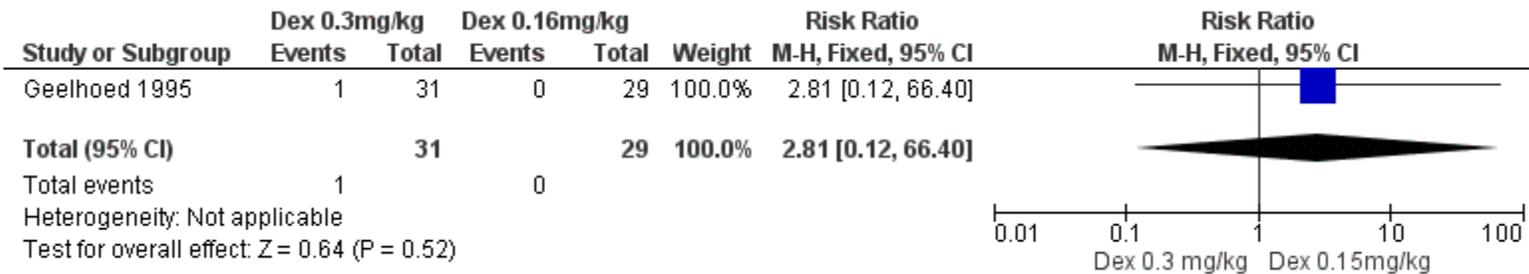
*Figure recreated using Russell (2011).

Figure 3. Comparison dexamethasone 0.6mg/kg versus dexamethasone 0.15mg/kg, Outcome Return visits and/or (re)admissions by inpatient/outpatient


*Figure recreated using Russell (2011).

Figure 4. Comparison dexamethasone 0.6mg/kg versus dexamethasone 0.3mg/kg, Outcome Return visits and/or (re)admissions by inpatient/outpatient


*Figure recreated using Russell (2011).

Figure 5. Comparison dexamethasone 0.3mg/kg versus dexamethasone 0.15mg/kg, Outcome Return visits and/or (re)admissions by inpatient/outpatient


*Figure recreated using Russell (2011).

Question (3): In children with croup, how long should observation be post racemic epinephrine dose and is there a rebound effect?

Question Originator: Croup Clinical Practice Guideline Work Group.

Croup CPG Team Recommendations: Observation should be for two hours post racemic epinephrine based on expert opinion. There is no evidence of a rebound effect resulting in increase in croup severity with racemic epinephrine treatment (Bjornson, 2011). This statement is in agreement with the guidelines we reviewed.

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Search Strategy and Results:

Search: ("Croup"[Mesh] OR croup OR "Parainfluenza Virus 2, Human"[Mesh] OR laryngotracheobronchitis OR laryngotracheitis) AND ("Racemic epinephrine"[Mesh] OR "Epinephrine"[Mesh] OR racemic OR epinephrin* OR rebound) Filters: From 2013/01/01

Guidelines and studies included in this review:

Croup (2012). Seattle Children's Hospital
Croup (2014) Children's Hospital of Philadelphia
Croup (2011) Children's Hospital of Colorado.
Bjornson, 2011

Guidelines and studies not included in this review with rationale for exclusion:

Nottingham Children's Hospital 2012 – recommended unavailable medications.
Petrocheilou 2014, Review article.

Method Used for Appraisal and Synthesis:

AGREE was used to evaluate the included Guidelines. The Cochrane Collaborative computer program, Review Manager (RevMan 5.3).

Question: (4) In children with croup, what are the criteria for admission?

Croup CPG Team Recommendations: Based on expert opinion, patients with moderate croup should be admitted after two failed doses of racemic epinephrine treatment. Patients with severe croup should be admitted after one failed racemic epinephrine treatment. Patients should be admitted if not otherwise meeting discharge criteria. This statement is in agreement with the guidelines we reviewed.

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Search Strategy and Results:

Search: ("Croup"[Mesh] OR croup OR "Parainfluenza Virus 2, Human"[Mesh] OR laryngotracheobronchitis OR laryngotracheitis) AND ("Patient Admission"[Mesh] OR ((admission OR hospitaliz* OR inpatient) AND criteri*)) ("Croup"[Mesh] OR croup OR "Parainfluenza Virus 2, Human"[Mesh] OR laryngotracheobronchitis OR laryngotracheitis) AND ("Patient Discharge"[Mesh] OR discharg* OR "Length of Stay"[Mesh])

Guidelines and studies included in this review:

Croup (2012). Seattle Children's Hospital
Croup (2014) Children's Hospital of Philadelphia
Croup (2011) Children's Hospital of Colorado.

Guidelines and studies not included in this review with rationale for exclusion:

Nottingham Children's Hospital 2012 – recommended unavailable medications.
Petrocheilou 2014 – Review article.

Method Used for Appraisal and Synthesis:

AGREE was used to evaluate the included Guidelines. The Cochrane Collaborative computer program, Review Manager (RevMan 5.3).

Question: (5) In children, are x-rays needed in the management of croup?

Question Originator: Croup Clinical Practice Guideline Work Group.

Croup CPG Team Recommendations: Based on expert opinion, radiographs are not necessary in croup with typical presentation that responds to therapy. This statement is in agreement with the guidelines we reviewed.

EBP Scholar's responsible for analyzing the literature:

Teresa Bontrager, RN, CPEN, BSME

Jamie Cailteux, RN, BSN, CPN

Jennifer Foley, RT(R)(N) CNMT

Anne Holmes, RN, MSN, MBA-HC, CCR

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Search Strategy and Results: Search: ("Croup"[Mesh] OR croup OR "Parainfluenza Virus 2, Human"[Mesh] OR laryngotracheobronchitis OR laryngotracheitis) AND ("Radiography, Thoracic"[Mesh] OR "Thorax/radiography"[Mesh] OR "Neck/radiography"[Mesh] OR "Tomography, X-Ray"[Mesh] OR "Tomography, X-Ray Computed"[Mesh] OR x-ray*)

Guidelines and studies included in this review:

Croup (2012). Seattle Children's Hospital

Croup (2014) Children's Hospital of Philadelphia

Croup (2011) Children's Hospital of Colorado.

Guidelines and studies not included in this review with rationale for exclusion:

Nottingham Children's Hospital 2012 – recommended unavailable medications.

Petrocheilou 2014 – Review article.

Method Used for Appraisal and Synthesis:

AGREE was used to evaluate the included Guidelines. The Cochrane Collaborative computer program, Review Manager (RevMan 5.3).

Question: (6) In children with, when is an ENT consultation necessary?

Question Originator: Croup Clinical Practice Guideline Work Group.

Croup CPG Team Recommendations: Based on expert opinion, ENT consultations are not necessary in croup with typical presentation that responds to therapy. This statement is in agreement with the guidelines we reviewed.

EBP Scholar's responsible for analyzing the literature:

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Search Strategy and Results:

Search: ("Croup"[Mesh] OR croup OR "Parainfluenza Virus 2, Human"[Mesh] OR laryngotracheobronchitis OR laryngotracheitis) AND ("Otolaryngology"[Mesh] OR otolaryngolog* OR ent)

Guidelines and studies included in this review:

Croup (2012). Seattle Children's Hospital

Croup (2014) Children's Hospital of Philadelphia

Croup (2011) Children's Hospital of Colorado.

Guidelines and studies not included in this review with rationale for exclusion:

Nottingham Children's Hospital 2012 – recommended unavailable medications.

Petrocheilou 2014 – Review article.

Method Used for Appraisal and Synthesis:

AGREE was used to evaluate the included Guidelines. The Cochrane Collaborative computer program, Review Manager (RevMan 5.3).

Question: (7) Are there valid and reliable croup scores to classify children with croup?

Question Originator: Croup Clinical Practice Guideline Work Group.

Croup CPG Team Recommendations: There is no validated tool to assess croup severity in the clinical setting.

EBP Scholar's responsible for analyzing the literature:

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Search Strategy and Results: Search: ("Croup"[Mesh] OR croup OR "Parainfluenza Virus 2, Human"[Mesh] OR laryngotracheobronchitis OR laryngotracheitis) AND (("Severity of Illness Index"[Mesh] AND (score* OR scoring)) OR "croup score" OR "croup scores" OR "croup scoring")

Guidelines and studies included in this review:

Croup (2012). Seattle Children's Hospital

Croup (2014) Children's Hospital of Philadelphia

Croup (2011) Children's Hospital of Colorado.

Guidelines and studies not included in this review with rationale for exclusion:

Nottingham Children's Hospital 2012 – recommended unavailable medications.

Petrocheilou 2014 – Review article.

Westly CR (1978), This study measured the clinical response of nebulized racemic epinephrine versus saline. It didn't aim to create a prognostic scoring system.

Method Used for Appraisal and Synthesis:

AGREE was used to evaluate the included Guidelines. The Cochrane Collaborative computer program, Review Manager (RevMan 5.3).

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