Texas Children's Hospital

DATE: March 2016

TEXAS CHILDREN'S HOSPITAL
EVIDENCE-BASED OUTCOMES CENTER
Croup
Evidence-Based Guideline

Definition: Croup, also known as laryngotracheobronchitis, is a respiratory illness that results in inflammation and swelling of the upper airway. It is usually self-limiting, with symptom resolution within 48 hours (up to 1 week). [1]

Pathophysiology: Croup is most commonly caused by *Parainfluenza* virus. Other causes include respiratory syncytial virus, influenza A and B, *Mycoplasma pneumonia*, and other respiratory viruses. [1]

Inclusion Criteria [1-2]
- 6 months to 6 years
- Previously healthy

Exclusion Criteria [1]
- Toxic appearance
- Known upper airway abnormality (stridor at rest)
- Hypotonia
- Neuromuscular disorder

Differential Diagnosis [2]
Bacterial tracheitis
Epiglottitis
Foreign body
Retropharyngeal abscess
Hereditary angioedema
Congenital abnormality
Anaphylaxis
Laryngomalacia
Tracheomalacia

Diagnostic Evaluation [1-2]
Croup occurs primarily in late fall to early winter but can occur year-round.

History: Assess for
- With or without antecedent upper respiratory symptoms of cough, rhinorrhea, fever
- Abrupt onset
- Symptoms worse at night
- Symptoms worse with agitation

Physical Examination
Complete routine vital signs including blood pressure

Assess for:
- Barky cough
- Hoarseness
- No to moderately high fever
- Irritability
- Inspiratory stridor
- Chest wall indrawing of varying severity
- Absence of drooling
- Non-toxic appearance
- Tachypnea
- Ability to talk or feed
- Retractions
- Mental status

Critical Points of Evidence*

Evidence Supports
- Administer PO dexamethasone 0.3 mg/kg to all patients with croup. If the patient is unable to tolerate oral administration, give IM dexamethasone instead. [1-2,3-17] – Strong recommendation, moderate quality evidence
- Give inhaled racemic epinephrine if the patient has stridor at rest. [1-2,18-23] – Strong recommendation, moderate quality evidence
- Observe the patient for 2 hours after epinephrine administration. [1-2] – Strong recommendation, very low quality evidence
- Admit patients who require supplemental oxygen. [24] – Strong recommendation, very low quality evidence

Evidence Against
- Do not routinely use mist therapy for the treatment of croup. [1-2,25,26] – Strong recommendation, moderate quality evidence
- Do not routinely use heliox for the treatment of croup. [2,27-30] – Strong recommendation with low quality evidence
- Do not routinely use viral testing or laboratory assessments. [1-2,31] – Strong recommendation, very low quality evidence

Evidence Lacking/Inconclusive
- Adopt the Alberta guideline's severity scoring guidance. [2] – Consensus recommendation
- Do not routinely use chest radiographs upon initial presentation to determine diagnosis and/or level of severity. [1-2] – Consensus recommendation
- Re-dose nebulized racemic epinephrine as needed every 2 hours with ongoing MD evaluation. Consider RRT/escalation of care if epinephrine is needed more frequently than every 2 hours and/or the patient has worsening hypoxia or respiratory distress. [1-2] – Consensus recommendation
- Admit patients who have received ≥3 doses of racemic epinephrine, patients who are unable to tolerate PO, and patients in significant respiratory distress. [1-2] – Consensus recommendation
- Discharge patients not meeting admission criteria and to advise parents when to return for care, i.e., patient has increasing respiratory distress and/or stridor at rest. [1-2] – Consensus recommendation

*NOTE: The references cited represent the entire body of evidence reviewed to make each recommendation.

Condition-Specific Elements of Clinical Management

Admission Criteria

- Significant respiratory distress
- ≥3 doses of racemic epinephrine administered
- Unable to tolerate PO
- Supplemental O_2 requirement

Discharge Criteria

- No stridor at rest
- No significant respiratory distress
- No supplemental O_2 requirement
- No symptom recurrence 2 hours after racemic epinephrine administration

Consults/Referrals

Consult ENT if the patient fails to respond to the 2nd dose of dexamethasone or if there is increased concern for alternate diagnosis

Measures

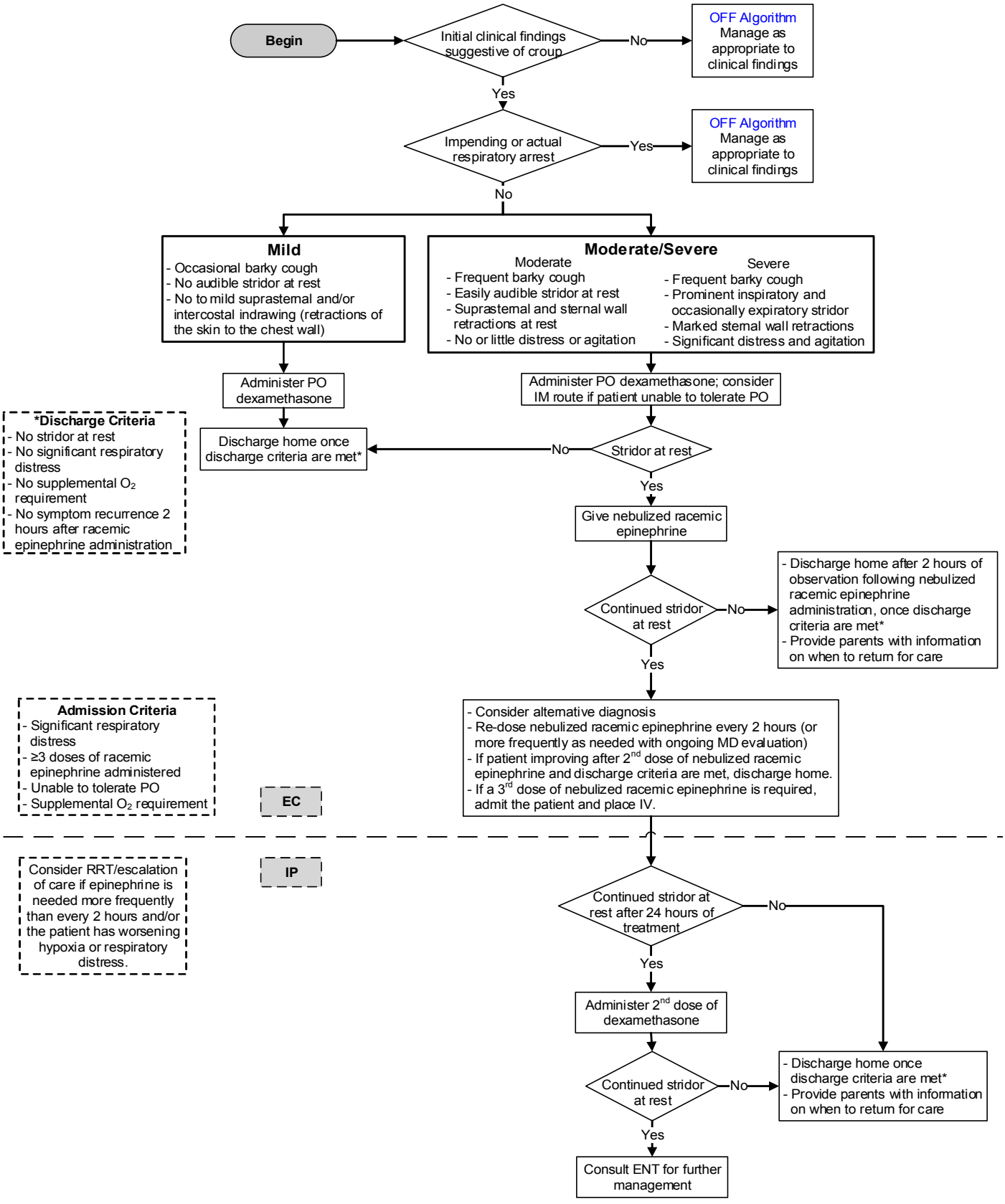
Process

- Order set utilization rate
- Proportion of patients with a chest x-ray obtained
- Proportion of patients with any imaging study obtained
- Proportion of patients with viral studies obtained
- Median time to first dose of racemic epinephrine
- Proportion of patients receiving racemic epinephrine (EC, IP)
- Median time to first dose of dexamethasone
- Proportion of patients receiving a 2nd dose of dexamethasone
- Proportion of patients with an ENT consult

Outcome

- Inpatient length of stay
- Admission rate
- Readmission rate

TCH Evidence-Based Outcomes Center
Clinical Algorithm for Croup



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Clinical Standards Preparation

This clinical standard was prepared by the Evidence-Based Outcomes Center (EBOC) team in collaboration with content experts at Texas Children's Hospital. Development of this clinical standard supports the TCH Quality and Patient Safety Program initiative to promote clinical standards and outcomes that build a culture of quality and safety within the organization.

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No relevant financial or intellectual conflicts to report.

Development Process

This clinical standard was developed using the process outlined in the EBOC Manual. The literature appraisal documents the following steps:

1. Review Preparation
   - PICO questions established
   - Evidence search confirmed with content experts
2. Review of Existing External Guidelines
   - Toward Optimized Practice (TOP; Alberta): Diagnosis and Management of Croup (January 2008), Seattle Children's Hospital: Croup (December 2011)
3. Literature Review of Relevant Evidence
   - Searched: Pubmed, Cochrane, Google
4. Critically Analyze the Evidence
   - 4 meta-analyses, 1 systematic review, 17 randomized controlled trials, and 7 nonrandomized studies
5. Summarize the Evidence
   - Materials used in the development of the clinical standard, literature appraisal, and any order sets are maintained in a Croup evidence-based review manual within EBOC.

Evaluating the Quality of the Evidence

Published clinical guidelines were evaluated for this review using the **AGREE II** criteria. The summary of these guidelines are included in the literature appraisal. AGREE II criteria evaluate Guideline Scope and Purpose, Stakeholder Involvement, Rigor of Development, Clarity and Presentation, Applicability, and Editorial Independence using a 4-point Likert scale. The higher the score, the more comprehensive the guideline.

This clinical standard specifically summarizes the evidence *in support of* or *against* specific interventions and identifies where evidence is *lacking/inconclusive*. The following categories describe how research findings provide support for treatment interventions.
"Evidence Supports" provides evidence to support an intervention
"Evidence Against" provides evidence against an intervention.
"Evidence Lacking/Inconclusive" indicates there is insufficient evidence to support or refute an intervention and no conclusion can be drawn *from the evidence*.

The **GRADE** criteria were utilized to evaluate the body of evidence used to make practice recommendations. The table below defines how the quality of the evidence is rated and how a strong versus weak recommendation is established. The literature appraisal reflects the critical points of evidence.

Recommendation	
STRONG	Desirable effects clearly outweigh undesirable effects or vice versa
WEAK	Desirable effects closely balanced with undesirable effects
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 (e.g., 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, RCTs with serious flaws or indirect evidence
Very Low	Evidence for at least 1 critical outcome from unsystematic clinical observations or very indirect evidence

Recommendations

Practice recommendations were directed by the existing evidence and consensus amongst the content experts. Patient and family preferences were included when possible. The Content Expert Team and EBOC team remain aware of the controversies in the diagnosis/management of Croup in children. When evidence is lacking, options in care are provided in the clinical standard and the accompanying order sets (if applicable).

Approval Process

Clinical standards are reviewed and approved by hospital committees as deemed appropriate for its intended use. Clinical standards are reviewed as necessary within EBOC at Texas Children's Hospital. Content Expert Teams are involved with every review and update.

Disclaimer

Practice recommendations are based upon the evidence available at the time the clinical standard was developed. Clinical standards (guidelines, summaries, or pathways) do not set out the standard of care and are not intended to be used to dictate a course of care. Each physician/practitioner must use his or her independent judgment in the management of any specific patient and is responsible, in consultation with the patient and/or the patient's family, to make the ultimate judgment regarding care.

Version History

Date	Action	Comments
Mar 2016	Originally completed	