

Best Evidence Statement (BESt)

Date: November 3, 2011

Title: Children with Croup and the Use of Steroids in the Emergency Department

Clinical Question: In children with croup seen in the Emergency Department, does the use of steroids versus no steroid decrease duration of symptoms and/or length of stay?

Symptoms: There are numerous scores that measure symptoms of croup. Symptoms that might be included are level of consciousness, cyanosis, stridor, air entry, retractions, and cough. Effect of steroid is generally demonstrated by an improvement in the symptom score used.

Target Population:

Inclusion: Children 0 to 18 years of age that present to the Emergency Department with mild, moderate, or severe croup

Exclusion: Children unable to tolerate glucocorticoids (prior history of adverse effect) or have already received a dose prior to Emergency Department visit.

Recommendation: (See Table of Recommendation Strength following references)

It is strongly recommended that a single dose of glucocorticoids be administered to children presenting to the Emergency Department with mild, moderate or severe croup (Russell 2011 [1a], Chub-Uppakarn 2007 [2b], Dobrovoljac 2009 [4a], Borland 2008 [4a], Port 2009 [5a], Syed 2009 [5a], RoyalChildren'sHospital 2011 [5b], Rajapaksa 2010 [5b]).

- **Note 1:** Children receiving steroids in the Emergency Department demonstrated significant improvement in symptoms and fewer return visits and/or (re)admissions as compared to placebo (*Russell 2011 [1a]*).
- **Note 2:** No conclusive studies exist, recommending one drug, dose or route over another for the treatment of croup. However, the oral route may be preferred due to the non-invasive nature causing less stress to the child, although intramuscular (IM), Intravenous (IV) or nebulized routes may be useful in children especially those unable to tolerate medications via the oral route (*Russell 2011 [1a]*, *LocalConsensus 2011 [5]*, *Syed 2009 [5a]*).
- **Note 3:** Patients receiving dexamethasone versus prednisolone in the treatment of croup demonstrated a statistically significant decreased likelihood of return visit/readmission compared to those receiving prednisolone, although clinical scores did not differ (Russell 2011 [1a]).
- Note 4: Children with severe croup may require additional, more aggressive therapies (Syed 2009 [5a]).

Discussion/Summary of Evidence related to the recommendation:

Glucocorticoid treatment of croup has consistently demonstrated improvements in symptoms as demonstrated by improved croup scores, within 6 hours, lasting for about 12 hours, decreased use of epinephrine, shortened hospital stays by 12 hours, and reduced subsequent visits or readmissions (*Russell 2011 [1a]*). Data indicate however, that the provision of steroids is not consistent (*Russell 2011 [1a]*, *Knapp 2010 [4a]*, *Borland 2008 [4a]*). When reviewed across pediatric Emergency Departments, steroids were prescribed 82% of the time, with a benchmark of 92% (*Knapp 2010 [4a]*). Although the evidence for the use of steroids in children with croup is consistent, what are not known are the most effective dose and drug.

Remaining questions regarding the use of steroids in the Emergency Department include how to increase the use of this evidence and additional studies are needed to determine the best drug and dose of glucocorticoids (Russell 2011 [1a]).

Reference List (Evidence Level in []; See Table of Evidence Levels following references)

- 1. **Borland, M. L.; Babl, F. E.; Sheriff, N.; and Esson, A. D.:** Croup management in Australia and New Zealand: a PREDICT study of physician practice and clinical practice guidelines. *Pediatric Emergency Care*, 24(7): 452-6, 2008, [4a] .
- 2. **Chub-Uppakarn, S., and Sangsupawanich, P.:** A randomized comparison of dexamethasone 0.15 mg/kg versus 0.6 mg/kg for the treatment of moderate to severe croup. *International Journal of Pediatric Otorhinolaryngology*, 71(3): 473-7, 2007, [2b] .
- 3. CroupWorkingGroup: Guideline for Diagnosis and Management of Croup. Alberta Medical Association, 2003, [5b] **.
- 4. **Denny, F. W.; Murphy, T. F.; Clyde, W. A., Jr.; Collier, A. M.; and Henderson, F. W.:** Croup: an 11-year study in a pediatric practice. *Pediatrics*, 71(6): 871-6, 1983, [4a] ◆.
- 5. **Dobrovoljac, M., and Geelhoed, G. C.:** 27 years of croup: an update highlighting the effectiveness of 0.15 mg/kg of dexamethasone. *Emergency Medicine Australasia,* 21(4): 309-14, 2009, [4a] •.
- 6. **Knapp, J. F.; Hall, M.; and Sharma, V.:** Benchmarks for the emergency department care of children with asthma, bronchiolitis, and croup. *Pediatric Emergency Care*, 26(5): 364-9, 2010, [4a] .
- 7. **LocalConsensus**, 2011, *[5]* **▼**.
- 8. **Port, C.:** Towards evidence based emergency medicine: best BETs from the Manchester Royal Infirmary. BET 4. Dose of dexamethasone in croup. *Emergency Medicine Journal*, 26(4): 291-2, 2009, [5a] .
- 9. Rajapaksa, S., and Starr, M.: Croup assessment and management. Australian Family Physician, 39(5): 280-2, 2010, [5b] .
- 10. **RoyalChildren'sHospital:** Clinical Practice Guidelines: Croup (Laryngotracheobronchitis). http://www.rch.org.aw/clinicalguide/index.cfm, 2011, [5b] .
- 11. Russell, K. F.; Liang, Y.; O'Gorman, K.; Johnson, D. W.; and Klassen, T. P.: Glucocorticoids for croup. Cochrane Database of Systematic Reviews, 1: CD001955, 2011, [1a] .
- 12. **Syed, I.; Tassone, P.; Sebire, P.; and Bleach, N.:** Acute management of croup in children. *British Journal of Hospital Medicine*, 70(1): M4-6, 2009, [5a] •.

Supporting Information

Background/Purpose of BESt Development:

Croup may present in children of all ages, however it is most common in children 6 months to 3 years of age (*Denny 1983 [4a], Syed 2009 [5a]*). Croup causes swelling in the larynx and trachea leading to hoarseness, a barking cough and noisy or difficulty breathing. Croup is usually mild and self-limited but sometimes medical intervention is sought for the need to improve symptoms. It has been found that glucocorticoids can reduce the swelling and make it easier for the child to breathe (*Russell 2011 [1a], Chub-Uppakarn 2007 [2b], Dobrovoljac 2009 [4a], Syed 2009 [5a], RoyalChildren'sHospital 2011 [5b], CroupWorkingGroup 2003 [5b])*. When reviewed across pediatric Emergency Departments, steroids were prescribed only 82% of the time, with a benchmark of 92% (*Knapp 2010 [4a]*).

Applicability Issues:

Uptake of known evidence

Outcome or Process Measures:

At CCHMC, the goal is that 92% of eligible children with Croup will receive a glucocorticoid dose in the Emergency Department.

Search Strategy:

Databases: Ovid Medline

#1

- 1. Croup mp. Or exp Croup
- 2. Limit 1 (English language and humans and yr="2006 -Current")
- 3. Limit 2 ("all infant (birth to 23 months)" or "all child (0 to 18 years)" or "newborn infant (birth to 1 month)" or "infant (1 to 23 months)" or "preschool child (2 to 5 years)" or "child (6 to 12 years)" or "adolescent (13 to 18 years)")
- 4. Steroids mp. Or exp Steroids
- 5. Limit 3 and 4

#2

- 1. Croup mp. Or exp Croup
- 2. Exp steroids Steroids/or steroids.mp.
- 3. 1 and 2

4. Limit 3 to (English language and humans and yr="2006 -Current")

#3

Additional articles identified from reference lists of retrieved articles

Relevant CCHMC Evidence-Based Documents:

CCHMC guidelines, BESts, policies/procedures, or parent education guides—none were found.

Group/Team Members:

Team Leader/Author: Joe Luria, MD/Emergency Medicine,

Team Members/Co-Authors: Christine White, MD, MAT/General Pediatrics, Michelle Caruso, PharmD, BCPS/Pharmacy **Support/Consultant:** Wendy Engstrom Gerhardt, MSN, RN-BC/James M. Anderson Center for Health Systems Excellence

Conflicts of Interest were declared for each team member and
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\boxtimes	No financial conflicts of interest were found.
	The following financial conflicts of interest were disclosed:

Note: Full tables of evidence grading system available in separate document:

- Table of Evidence Levels of Individual Studies by Domain, Study Design, & Quality (abbreviated table below)
- Grading a Body of Evidence to Answer a Clinical Question
- <u>Judging the Strength of a Recommendation</u> (abbreviated table below)

Table of Evidence Levels (see note above)

Quality level	Definition				
1a [†] or 1b [†]	Systematic review, meta-analysis, or meta-synthesis of multiple studies				
2a or 2b	Best study design for domain				
3a or 3b	Fair study design for domain				
4a or 4b	Weak study design for domain				
5a or 5b	General review, expert opinion, case report, consensus report, or guideline				
5	Local Consensus				

[†]a = good quality study; b = lesser quality study

Table of Recommendation Strength (see note above)

Strength	Definition							
It is strongly recommended that	There is conse	nsus that benefits clear	rly outweigh risks and burdens					
It is strongly recommended that not	(or visa-versa	for negative recommen	dations).					
It is recommended that	There is conse	nsus that benefits are o	closely balanced with risks and burd	ens.				
It is recommended that not								
There is insufficient evidence and a lack of consensus to make a recommendation								
Dimensions for Judging the Strength of the Recommendation								
Reflecting on your answers to the dimensions below and given that more answers to the left of the scales indicates support for a stronger								
recommendation, complete one of the sentences above to judge the strength of this recommendation.								
(Note that for negative recommendations, the left/right logic may be reversed for one or more dimensions.)								
1. Grade of the Body of Evidence		High	☐ Moderate	Low				
2. Safety / Harm		Minimal Minimal	Moderate	Serious				
3. Health benefit to patient		Significant	Moderate	Minimal				
4. Burden on patient to adhere to recomm	endation	⊠ Low	Unable to determine	High				
5. Cost-effectiveness to healthcare system		☐ Cost-effective	Inconclusive	☐ Not cost-effective				
6. Directness of the evidence for this target population		□ Directly relates	Some concern of directness	☐ Indirectly relates				
7. Impact on morbidity/mortality or qualit	y of life	High	Medium	Low				
Comments on Dimensions (optional):								
Studies reported no adverse events associated with the use of glucocorticoids (Russell 2011 [1a]).								

Copies of this Best Evidence Statement (BESt) and related tools (if applicable, e.g., screening tools, algorithms, etc.) are available online and may be distributed by any organization for the global purpose of improving child health outcomes.

Website address: http://www.cincinnatichildrens.org/svc/alpha/h/health-policy/best.htm

Examples of approved uses of the BESt include the following:

- copies may be provided to anyone involved in the organization's process for developing and implementing evidence based care;
- hyperlinks to the CCHMC website may be placed on the organization's website;
- the BESt may be adopted or adapted for use within the organization, provided that CCHMC receives appropriate attribution on all written or electronic documents; and
- copies may be provided to patients and the clinicians who manage their care.

Notification of CCHMC at EBDMinfo@cchmc.org for any BESt adopted, adapted, implemented, or hyperlinked by the organization is appreciated.

Please cite as: Cincinnati Children's Hospital Medical Center: Best Evidence Statement Children with Croup and Use of Steroids in the Emergency Department http://www.cincinnatichildrens.org/svc/alpha/h/health-policy/best.htm, BESt 113, pages 1-4, 11-03-2011.

This Best Evidence Statement has been reviewed against quality criteria by 2 independent reviewers from the CCHMC Evidence Collaboration.

For more information about CCHMC Best Evidence Statements and the development process, contact the Evidence Collaboration at EBDMinfo@cchmc.org.

Note

This Best Evidence Statement addresses only key points of care for the target population; it is not intended to be a comprehensive practice guideline. These recommendations result from review of literature and practices current at the time of their formulation. This Best Evidence Statement does not preclude using care modalities proven efficacious in studies published subsequent to the current revision of this document. This document is not intended to impose standards of care preventing selective variances from the recommendations to meet the specific and unique requirements of individual patients. Adherence to this Statement is voluntary. The clinician in light of the individual circumstances presented by the patient must make the ultimate judgment regarding the priority of any specific procedure.