Critically Appraised Topic (CAT):
Low-dose vs. high-dose of dexamethasone for Croup

Specific Care Question

In children with croup in inpatient or outpatient settings, is a lower dose of dexamethasone (0.15 mg/kg) as effective as the standard dose (0.6 mg/kg) in improving clinical outcomes?

Recommendations from the Croup Clinical Pathway Committee

*A **conditional** recommendation is made **against** the use of lower-dose dexamethasone based on very low certainty of evidence and clinical expertise. While evidence suggests that 0.15 mg/kg dosing may be sufficient in the outpatient setting, where patients have, on average, milder disease, there is insufficient evidence to support a lower dose for admitted patients.[3-5] While three of the four studies excluded admitted patients, a single inpatient study found no difference in croup severity scores between lower and higher doses of dexamethasone at 2 hours.[6] However, the study favored 0.6 mg/kg dexamethasone at 6 and 12 hours, as evidenced by changes in croup severity scores.[6] Clinicians in ambulatory or emergency settings are unlikely to know at the time of dexamethasone ordering if the patient will require admission, and repeat dosing for admitted patients is not ideal.*

Rationale for Question Asked

Glucocorticoids are the standard treatment for croup, with dexamethasone commonly administered as a one-time dose ranging from 0.15 mg/kg to 0.6mg/kg.[1] While significant adverse events are uncommon, single doses may be associated with nausea and vomiting, hyperglycemia, or sleep disturbance.[2] The Croup Clinical Pathway Committee sought to review the evidence on dexamethasone dosing and determine whether a lower dose could be used without compromising outcomes for children with croup.

Overview of Evidence

A Cochrane systematic review of glucocorticoids for children with croup analyzed 13 comparisons, of which one met our review criteria.[1] The study comparison that met our criteria was addressed by four randomized controlled trials (*N* = 998) from the Cochrane (2023) systematic review involving children with croup treated in either an outpatient or an inpatient setting.[3-6] The individual studies compared the efficacy of dexamethasone dosing, evaluating one or more outcomes of interest, including croup severity scores at 2, 6, 12, and 24 hours and return visits or readmissions.[1]

Croup severity score

The comparison between 0.6 mg/kg and 0.15 mg/kg dexamethasone administration analyzed changes in croup severity scores (relative to the average score at the indicated time) from baseline to 2, 6, 12, and 24 hours. While the Cochrane systematic review combined inpatient and outpatient populations, this review analyzed inpatient and outpatient data separately.

Inpatient. One RCT (*n* = 41) favors administration of 0.6 mg/kg dexamethasone compared to 0.15 mg/kg of dexamethasone for improving the Westley croup severity scores at 2 hours (*SMD* = -0.63, 95% CI [-1.25, 0.00]), 6 hours (*SMD* = -1.43, 95% CI [-2.13, -0.74]), and 12 hours (*SMD* = -2.55, 95% CI [-3.39, -1.71]) after administration (See Figure 2).[6]

Outpatient. One RCT (*n* = 820) reported no difference between those receiving 0.6 mg/kg and those receiving 0.15 mg/kg of dexamethasone at 2 hours after administration, *with SMD* = -0.10 (95% CI [-0.23, 0.04]).[3] Two RCTs (*n* = 137) reported no difference between those receiving 0.6 mg/kg and those receiving 0.15 mg/kg of dexamethasone at 6 hours after administration, *SMD* = -0.02, 95% CI [-0.35, 0.32].[4-5] Conversely, analysis of a single RCT (*n* = 72) favors use of 0.15 mg/kg dexamethasone for decreasing the Westley croup severity score at 12 hours (*SMD* = 1.32, 95% CI [0.81, 1,83]) and 24 hours (*SMD* = 0.63, 95% CI [0.16, 1.10]) after administration (See Figure 3).[4]

Certainty of the Evidence for Croup Severity Score

The certainty of the evidence for the four RCTs was very low due to serious imprecision (low number of participants in the inpatient setting [*n* = 41]) and serious indirectness (combining inpatients and outpatients and multiple timepoints).

Return visits or (re)admissions or both
Three RCTs (*n* = 949) reported no difference in return visits or (re)admissions for outpatients between those receiving 0.6 mg/kg compared to 0.15 mg/kg of dexamethasone, *RR* = 0.91, 95% CI [0.71, 1.71], *p* = 0.48.[3-5]

Certainty of Evidence for Return Visits
The certainty of evidence for the three RCTs was moderate due to serious indirectness (no data reflected the impact on inpatient re-admissions, and the studies addressed only the outpatient population).

Study characteristics. The search for suitable studies was completed on January 27th, 2026. Dr. Kathleen Berg reviewed the 81 titles and/or abstracts found in the search and identified one systematic review and two single studies believed to answer the question. After full-text review, one relevant comparison within the Cochrane systematic review met our inclusion criteria and addressed the clinical question.

Identification of Studies
Search Strategy and Results (see Figure 1)

EMBASE: #1: ('croup'/exp OR 'croup' OR 'croup therapy'/exp OR 'croup therapy') AND ('dexamethasone'/exp OR 'dexamethasone' OR 'glucocorticoid'/exp OR 'glucocorticoid'); #2:('croup'/exp OR 'croup' OR 'croup therapy'/exp OR 'croup therapy') AND ('dexamethasone'/exp OR 'dexamethasone' OR 'glucocorticoid'/exp OR 'glucocorticoid') AND [2022-2026]/py;#3: #2 NOT ('animal cell'/de OR 'animal experiment'/de OR 'animal model'/de OR 'case report'/de OR 'mouse model'/de); #4: #3 AND ('Article'/it OR 'Editorial'/it OR 'Letter'/it OR 'Note'/it OR 'Review'/it)

PubMed: ("Croup"[Mesh] OR croup) AND ("Dexamethasone"[Mesh] OR dexamethasone OR "Glucocorticoids"[Mesh] OR glucocorticoid)

Search Dates: 2022-Current (These dates were selected to capture any literature that was published following the Cochrane systematic review in 2023).
Records identified through database searching, *n* = 81
Additional records identified through other sources *n* = 0

Question Originator
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Medical Librarian Responsible for the Search Strategy
K. Swaggart, MLIS, AHIP
EBP Team Members Responsible for Analyzing Literature
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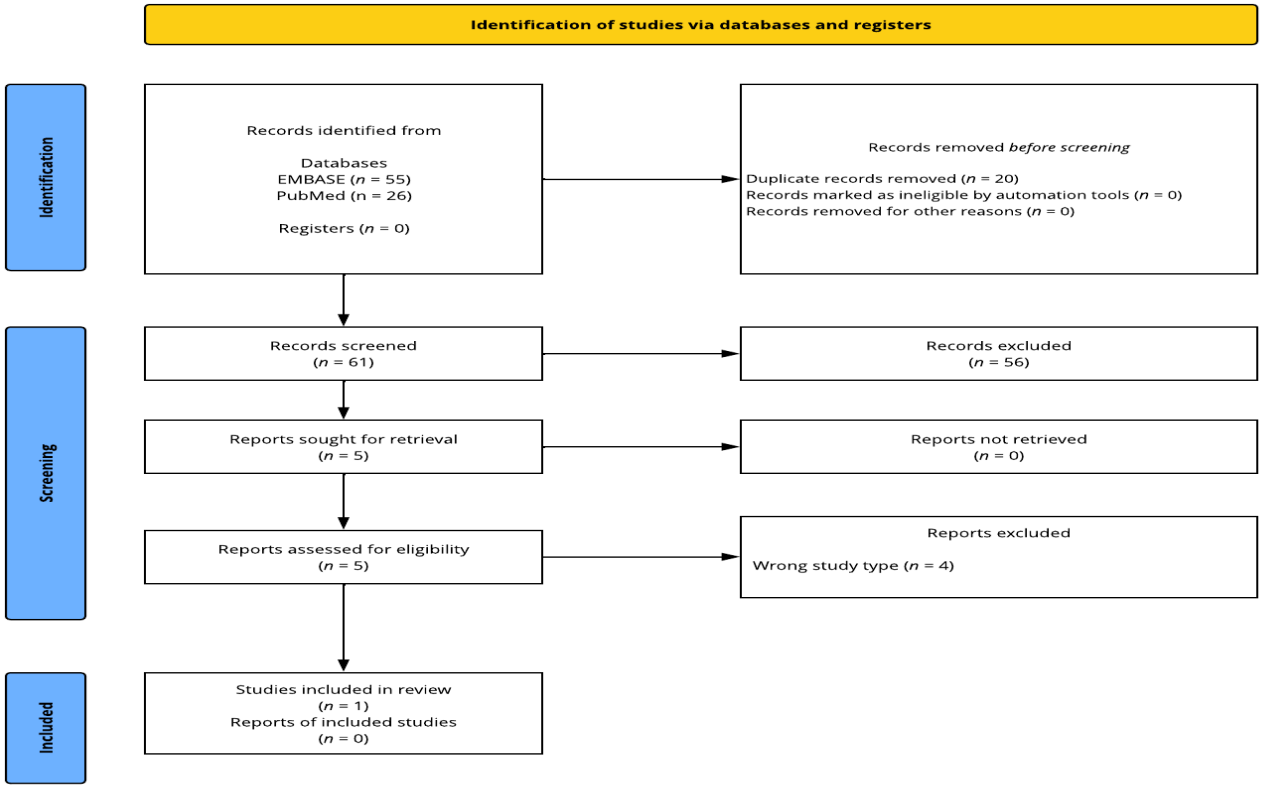
EBP Medical Director Responsible for Reviewing the Literature
K. Berg, MD, FAAP
EBP Team Member Responsible for Reviewing, Synthesizing, and Developing this Document
A. Melanson, OTD, OTR/L

Figure 1
Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA)[7]



Meta-analyses

Figure 2
Dexamethasone administration 0.6 mg/kg compared to 0.15 mg/kg. Outcome: Croup Severity Scores Inpatient

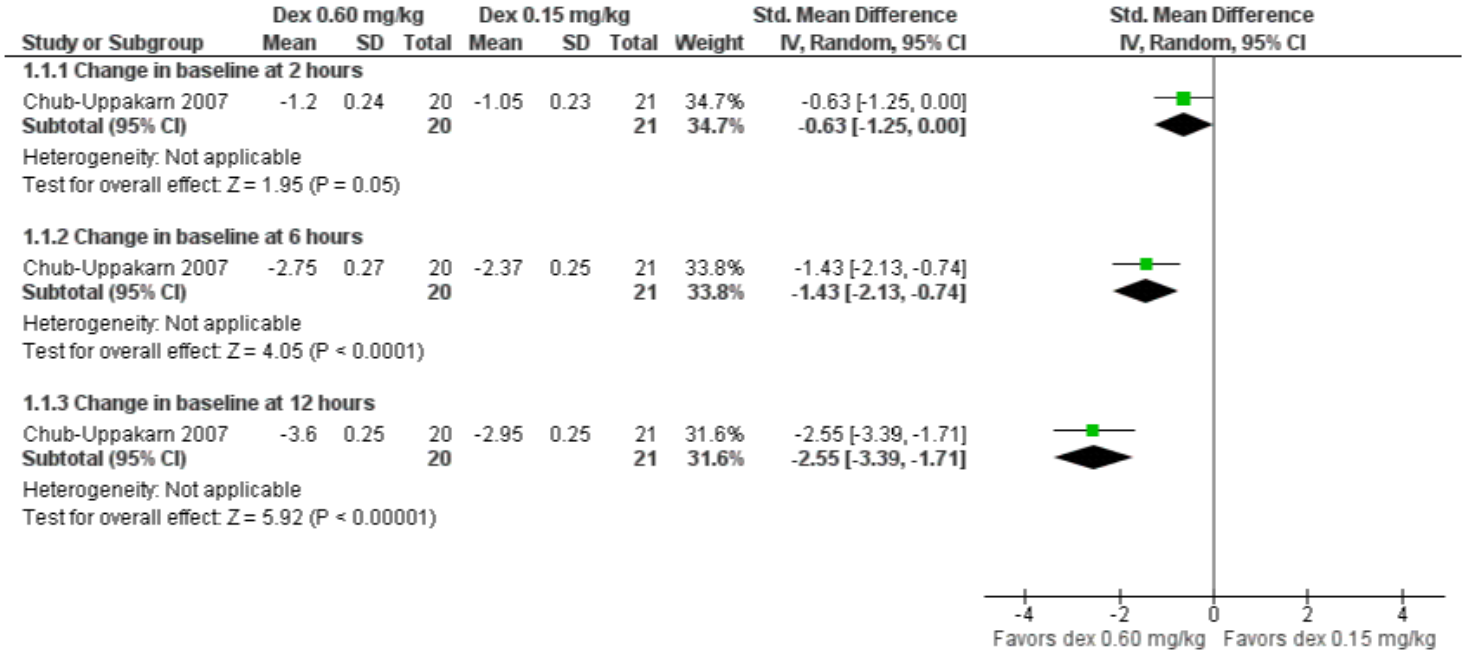
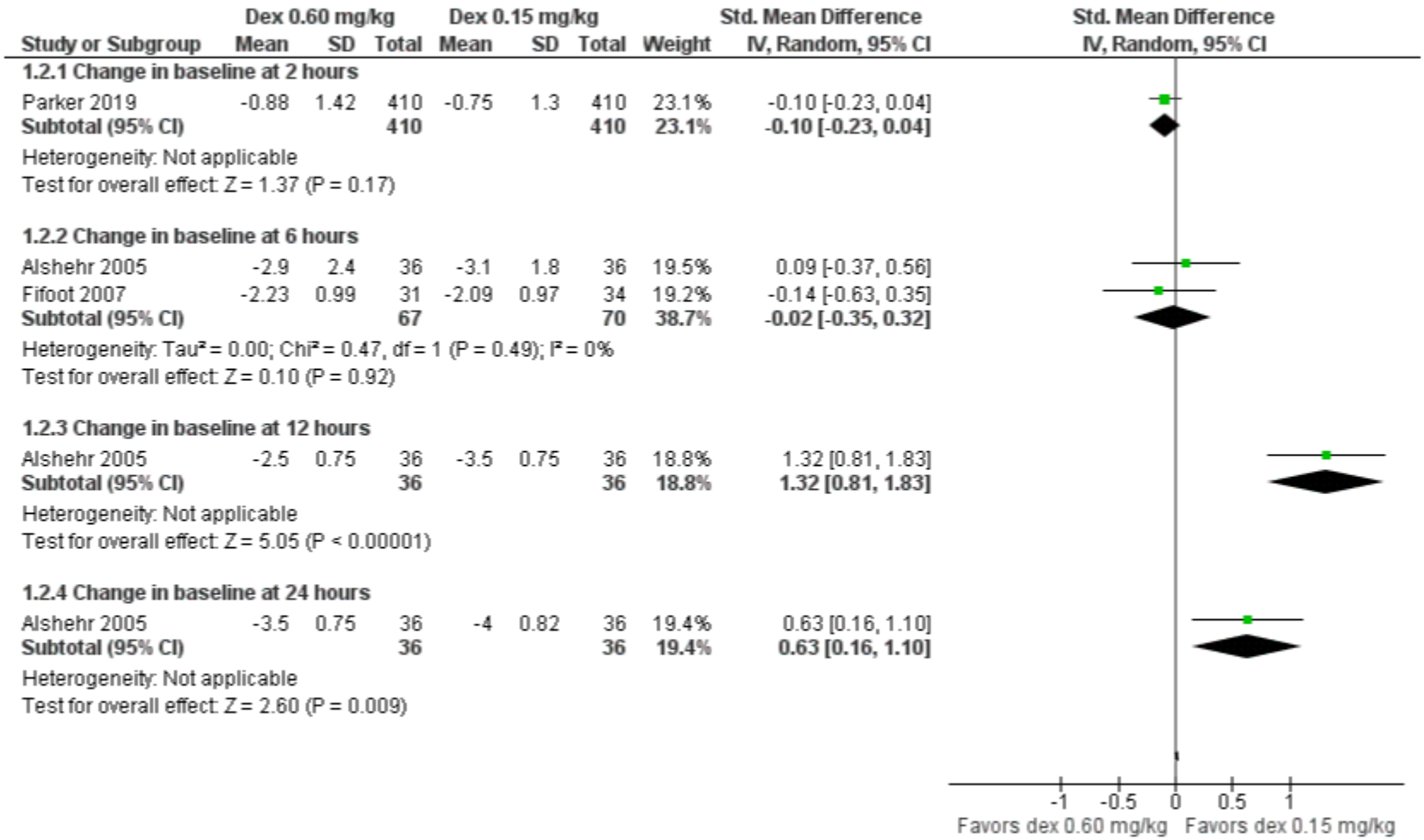


Figure 3
Dexamethasone administration 0.6 mg/kg compared to 0.15 mg/kg. Outcome: Croup Severity Scores Outpatient



Critically Appraised Topic (CAT): Low-dose vs. high-dose of dexamethasone for Croup

Characteristics of Included Studies
Aregbesola (2023)

Design	Quantitative Synthesis (meta-analysis)
Objective	Investigate the effects and safety of glucocorticoids in the treatment of croup in children 18 years and younger.
Methods	**Criteria for considering studies for this review** • **Types of studies:** RCTs • **Participants:** Children aged 18 years and below with croup • **Target Condition(s):** Croup (mild, moderate, or severe) **Search methods for the identification of studies** • **Electronic databases searched:** ○ Cochrane Library, which includes the Cochrane Central Register of Controlled Trials (CENTRAL; 2022 Issue 9) ○ Ovid MEDLINE Epub Ahead of Print, In-Process & Other Non-Indexed Citations and Ovid MEDLINE (1946 to 4 March 2022) ○ Embase (Ovid) (1974 to 4 March 2022) • **Search strategy employed:** ○ Search strategy utilized by a medical librarian, the 2022 update search strategy is included as Appendix 1 in the Cochrane systematic review • **Searching other resources (such as the reference list):** ○ WHO ICTRP and ClinicalTrials.gov on 4 March 2022 ○ Reference lists of relevant systematic reviews identified during screening and the included studies to additional relevant primary studies **Data collection and analysis** • **Inclusion criteria:** ○ Randomized controlled trials in children 18 years and younger with croup that assess the effect of glucocorticoids compared to the following: placebo, any other pharmacologic agents, any other glucocorticoids, any combination of other glucocorticoids, given by different modes of administration, or given in different doses ○ The included studies must have assessed at least one of the primary (change in croup score or return visits, readmissions to the hospital, or both) or secondary (length of stay in hospital or emergency department, patient improvement, use of additional treatments, or adverse events) outcomes • **Exclusion criteria:** ○ Studies that did not meet the inclusion criteria were excluded • **Setting:** ○ Emergency department, inpatients, and outpatients ○ Saudi Arabia, Israel, Canada, Turkey, Thailand, USA, Australia, Greece, England, China, Denmark, Finland, Spain, Netherlands, Iran, Germany, • **Data collection process:** Review authors extracted data independently and verified it by a third review author. The data were entered into Review Manager 5 for meta-analysis. Two review authors assessed studies for risk of bias independently using the Cochrane risk of bias tool. • **Assessment of the certainty of the evidence:** ○ Two review authors assess the certainty of the evidence for the primary outcomes using the GRADE approach. • **Data Synthesis**: ○ **Overall Effect Size** ▪ **Standard Mean Difference** ▪ **Relative Risk**

	▪ **95% CI** ○ **Heterogeneity** ▪ **Chi²** ▪ **I²** (I^2 of < 40% to be low, 30% to 60% to be moderate, 50% to 60% to be substantial, 75% to 100% to be considerable)
Results	**Study Selection (actual results/data)** **Number of articles identified:** *N* = 100 **Full-text articles assessed for eligibility:** *n* = 10 ○ **Studies included in previous update** *n* = 43 ○ **Studies included in qualitative synthesis:** *n* = 45 **Synthesis of quality of evidence** (strength of evidence): • Strength of evidence was not reported; however, certainty of the evidence was evaluated using the GRADE approach and ranged from very low certainty to high certainty across the studies included. • Most studies (98%) had problems related to their methods, reporting issues, or both. • Threats to the certainty of the evidence related to risk of bias, inconsistency, and imprecision of study results were found among most of the comparisons. **Synthesis of quantitative evidence:** • For the comparison of 0.6 mg/kg dexamethasone to 0.15 mg/kg and outcome of croup severity score from baseline to 2, 6, 12, and 24 hours: ○ **Overall Effect Size** ▪ Two hours: *SMD* = -0.27, 95% CI [-0.76, 0.22] ▪ Six hours: *SMD* = -0.45, 95% CI [-1.26, 0.35] ▪ Twelve hours: *SMD* = -0.60, 95% CI [-4.39, 3.19] ▪ Twenty-four hours: *SMD* = 0.63, 95% CI [0.16, 1.10] • For the comparison of 0.6 mg/kg dexamethasone to 0.15 mg/kg and the outcome of return visits or re-admissions of children or both: ○ **Overall Effect Size** ▪ *RR* = 0.78, 95% CI [0.34, 1.75] • Overall Heterogeneity was assessed to be moderate to high for most comparisons
Discussion	**Summary of evidence** Four RCTs investigated dexamethasone administered at 0.6 mg/kg to 0.15 mg/kg. There was no reduction in croup score after two hours for inpatients treated with 0.60 mg/kg dexamethasone compared to those treated with 0.15 mg/kg dexamethasone. There was probably no reduction in croup score after six hours for children (outpatient or inpatient) treated with 0.60 mg/kg dexamethasone compared to those treated with 0.15 mg/kg dexamethasone. After 12 hours, we do not know whether there was a difference in the change in croup score between children treated with 0.60 mg/kg and 0.15 mg/kg dexamethasone (The effect differed between inpatients and outpatients). One outpatient study showed that there was probably a reduction in croup score with 0.60 mg/kg after 24 hours **Limitations-** While a lower dose of 0.15 mg/kg dexamethasone may be as effective as the standard dose of 0.6 mg/kg, more RCTs are needed to strengthen the evidence for its effectiveness in treating croup.
Funding	**Funding** Funding sources included government (11%), academic or research institute (7%), industry (18%), or foundations (9%). More than half of the studies (55%) did not report funding sources

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