Office of Evidence Based Practice (EBP) – Critically Appraised Topic: Oral Dexamethasone vs. Prednisone for a Pediatric Asthma Exacerbation

Specific Care Question
Is oral dexamethasone more efficacious than prednisone/prednisolone for a pediatric asthma exacerbation?

Question Originator
The Asthma in the Emergency Department/ Urgent Care Center Clinical Practice Guideline Team

Literature Summary

Background. Children with an asthma exacerbation present to the ED/Urgent Care Center (UCC) with wheezing, tightness in their chest and difficulty breathing. Glucocorticosteroids (CS) are a first line medication used to reduce inflammation and reduce the symptoms of asthma. However, CS can have side effects, and reducing the side effects of treatment is an important goal. There are three types of oral CS used: (a) dexamethasone, (b) prednisone (tablet) or (c) prednisolone (syrup). The medications are similar in how well and how quickly they decrease asthma symptoms (Bravo-Soto, Harismendy, Rojas, Silva, & von Borries, 2017; Rowe, Edmonds, Spooner, Diner, & Camargo, 2004).

Dexamethasone is a long acting steroid medication that is five times stronger than prednisone/prednisolone and has a longer half-life (Hendeles, 2003). Prednisone and/or prednisolone have been the preferred medications to treat acute asthma because it is believed there are fewer side effects, such as hyperactivity, nausea, and reduced growth. The heterogeneity in doses of both forms of CS is great in the included studies, see Table 4). See Table 5 for the range of corticosteroid doses. A smaller, less frequent dose of dexamethasone may increase the ability of the child to take the medication. See Table 6 for a comparison of dexamethasone, hydrocortisone, and prednisone/olone for (a) anti-inflammatory potency, (b) salt retention, (c) suppression of the hypothalamic pituitary adrenal (HPA) axis, and (d.) biological half-life (Cutrera et al., 2017). With dexamethasone there is longer adenocorticotropic hormone (ACTH) suppression with longer biological half-life (Cutrera et al., 2017).

Study characteristics. The search for suitable studies was completed on April 6, 2018 and April 7, 2018. Irene Walsh, MD, Amanda Nedved, MD, and Jeff Michael, DO reviewed the 31 titles and abstracts found in the search and identified six articles believed to address the question. After an in-depth review three articles (Bravo-Soto et al., 2017, Paniagua et al., 2017, and Aljebab, Alanazi, Choonara, and Conroy, 2018) are added to the previous Children's Mercy Hospital Critically Appraised Topic, Dexamethasone vs. Predisone/olone, (2016). Bravo-Soto et al. (2017) is a systematic review that is included as a source for studies. It includes ten studies, seven of which were in the previous CMH CAT, and three that were not. Of the three new studies, two were excluded (Scarfone et., 1995; Mathew, 2015) (see Studies Excluded) and one is included (Kravitz, Dominici, Ufberg, Fisher, & Giraldo, 2011). Paniagua et al. (2017) and Aljebab, Alanazi, Choonara, & Conroy (2018) are new RCTs, the former evaluated efficacy and the latter evaluated palatability.

Key results CSs have similar efficacy, and short term adverse events outcomes are not found in otherwise healthy children (Fernandes et al., 2014). Long term adverse events (such as hypertension, adrenal suppression) outcomes are poorly studied. The decision to select one or another for treatment may be based on compliance to treatment and adverse events including (a) vomiting in the ED, (b) vomiting at home, and (c) adrenal suppression in children with frequent asthma exacerbations. No studies were identified that evaluated these as primary outcomes.

Summary by Outcome

Admission at initial presentation. Three studies (*n* = 1007) are included for this outcome (Altamimi et al., 2006; Cronin et al., 2015; Qureshi, Zaritsky, & Poirier, 2001). The evidence is graded as very low based on (a) serious risk of bias as only one study clearly stated randomization procedures, (b) serious inconsistency among the studies as the doses of the medications and the number of days the medication was administered varied, and (c) serious imprecision of the results as (*i*.) there are low number of admissions in the included studies, and (*ii*.) the confidence interval for the main effect crosses the line of no effect, *OR* = 1.33, 95% CI [0.90, 1.99] (see Figure 3).

Pulmonary score. Two studies (*n* = 345) are included for this outcome (Altamimi et al., 2006; Cronin et al., 2015). The evidence is graded as very low based on (a) serious risk of bias as only one study clearly stated randomization procedures, (b) serious inconsistency as two pulmonary scores were used, one study used the valid PRAM score, while the other used a modification of the PSAS score. Furthermore, one study measured the score at discharge, while the other measured the score at Day 4 past the index visit. The modification of the PSAS score was not tested for validity or reliability. The *Mean Difference* = -0.00, 95% CI [-.29, .29] see Figure 4).

Length of stay in the ED. Two studies (*n* = 667) are included for this outcome (Altamimi et al., 2006; Paniagua et al., 2017). The evidence is graded as low based on (a) inconsistency as the doses of the medications and the number of days the medication was administered varied, and (b) imprecision the difference in LOS as only 14 minutes shorter in the dexamethasone group compared to the prednisone/olone group. *Mean difference* = -.24, 95% CI [-.97, .48] (see Figure 5).

Peak expiratory flow rate (PEFR) at discharge. One study (*n* = 14) is included for this outcome (Altamimi et al., 2006). The evidence is graded as very low due to imprecision, the difference in PEFR was 34 meters/min higher in the group treated with dexamethasone compared to those treated with prednisone *Mean difference* = 34, 95% CI [54, 122] (see Figure 6).

Relapse. Six studies (*n* = 1734) are included for this outcome (Altamimi et al., 2006; Cronin et al., 2015; Gordon, Tompkins, & Dayan, 2007; Greenberg, Kerby, & Roosevelt, 2008; Klig, Hodge, & Rutherford, 1997; Kravitz, Dominici, Ufberg, Fisher, & Giraldo, 2011). The evidence is graded as low based on (a) serious risk of bias as only two of the four studies described randomization clearly, and (b) imprecision as only one study performed intention to treat analysis and the odds ratio crosses the line of no effect, *OR* = 0.75, 95% CI [0.49, 1.16] (see Figure 7).

Vomiting. Five studies (*n* = 1558) are included for this outcome (Altamimi et al., 2006; Cronin et al., 2015; Greenberg et al., 2008; Paniagua et al., 2017; Qureshi et al., 2001). The evidence is graded as very low based on (a) serious risk of bias as randomization did not occur in two of the five studies, (b) The studies compared different doses and different dosing schedules. The different dosing schedules (dexamethasone once a day for two days, and prednisone/olone twice a day for 5 days) allowed two opportunities to vomit in the dexamethasone group per treatment course, while the prednisone/olone group had up to 10 opportunities to vomit per treatment course, and (c) serious imprecision, as vomiting was not the primary outcome in any of the studies. The studies were not powered to find differences in vomiting (see Figure 8).

Palatability. One study (n = 255) is included for this outcome (Aljebab, Alanazi, Choonara, & Conroy, 2018). Subjects 2- 18 years of age with asthma or croup were included. All the croup patients received oral dexamethasone. Three different formulations of CS were evaluated: (a) prednisolone base tablet, (b) prednisolone sodium phosphate (soluble tablet or syrup), (c) dexamethasone (elixir or solution). All were disliked on the first day of treatment. Prednisolone base tablets had the lowest palatability scores, where 100% disliked the taste, whereas 89% of the prednisolone sodium phosphate group, and 76% of the dexamethasone group disliked the taste. However, all prednisolone palatability scores significantly improved with subsequent dosing. Subjects treated with dexamethasone were more likely to have abdominal pain, while those treated with prednisolone were more likely to have nausea and vomiting. This is an observational study.

Search Strategy and Results (see PRISMA diagram)

("Asthma/drug therapy"[Mesh] OR "status asthmaticus") AND ((("Steroids"[Mesh] OR corticosteroids[tw] OR "Glucocorticoids"[Mesh] OR "Glucocorticoids"[Pharmacological Action] OR "Dexamethasone 21-phosphate"[Supplementary Concept] OR Dexamethasone[tw] OR "Adrenal Cortex Hormones" [Pharmacological Action]) AND ("Administration, Oral"[Mesh] OR "Administration, Intravenous"[Mesh] OR "Injections"[Mesh])) OR Prednisone[tw] OR Prednisolone[tw] OR Methylprednisolone[tw]) AND ("2016/06/01"[PDAT] : "2018/12/31"[PDAT]) AND English[lang] AND (child OR children OR childhood OR pediatr* OR paediatr*) 33 articles returned

Studies Included in this Review (in Alphabetical Order)

Aljebab et al. (2018)
Altamimi et al. (2006)
Bravo-Soto et al. (2017)
Cronin et al. (2015)
Gordon, Tompkins, & Dayan (2007)
Greenberg, Kerby, & Roosevelt (2008)
Gries, Moffitt, Pulos, & Carter (2000)
Klig, Hodge, & Rutherford (1997)
Kravitz, Dominici, Ufberg, Fisher, & Giraldo (2011)
Paniagua et al. (2017)
Qureshi, Zaritsky, & Poirier (2001)

Studies Not Included in this Review with Exclusion Rationale (in Alphabetical Order)

Authors (YYYY)	Reason for exclusion
Castro-Rodriguez, Rodrigo, & Rodriguez-Martinez, (2015)	Does not answer the question; does not include dexamethasone
Mathew (2015	Not an RCT
Scarfone et al. (1995)	Nebulized dexamethasone
Taylor, Li, Almossawi, Dulfeker, & Jones, (2016)	Does not answer the question; does not include dexamethasone

Method Used for Appraisal and Synthesis

The Cochrane Collaborative computer program, Review Manager (Higgins & Green, 2011)[a] was used to synthesize the XXX included studies. GRADEpro GDT (Guideline Development Tool) is the tool used to create the Summary of Findings Tables for this analysis.

[a]Higgins, J. P. T., & Green, S. e. (2011). *Cochrane Handbook for Systematic Reviews of Interventions [updated March 2011]* (Version 5.1.0 ed.): The Cohcrane Collaboration, 2011.

Librarian responsible for the literature search
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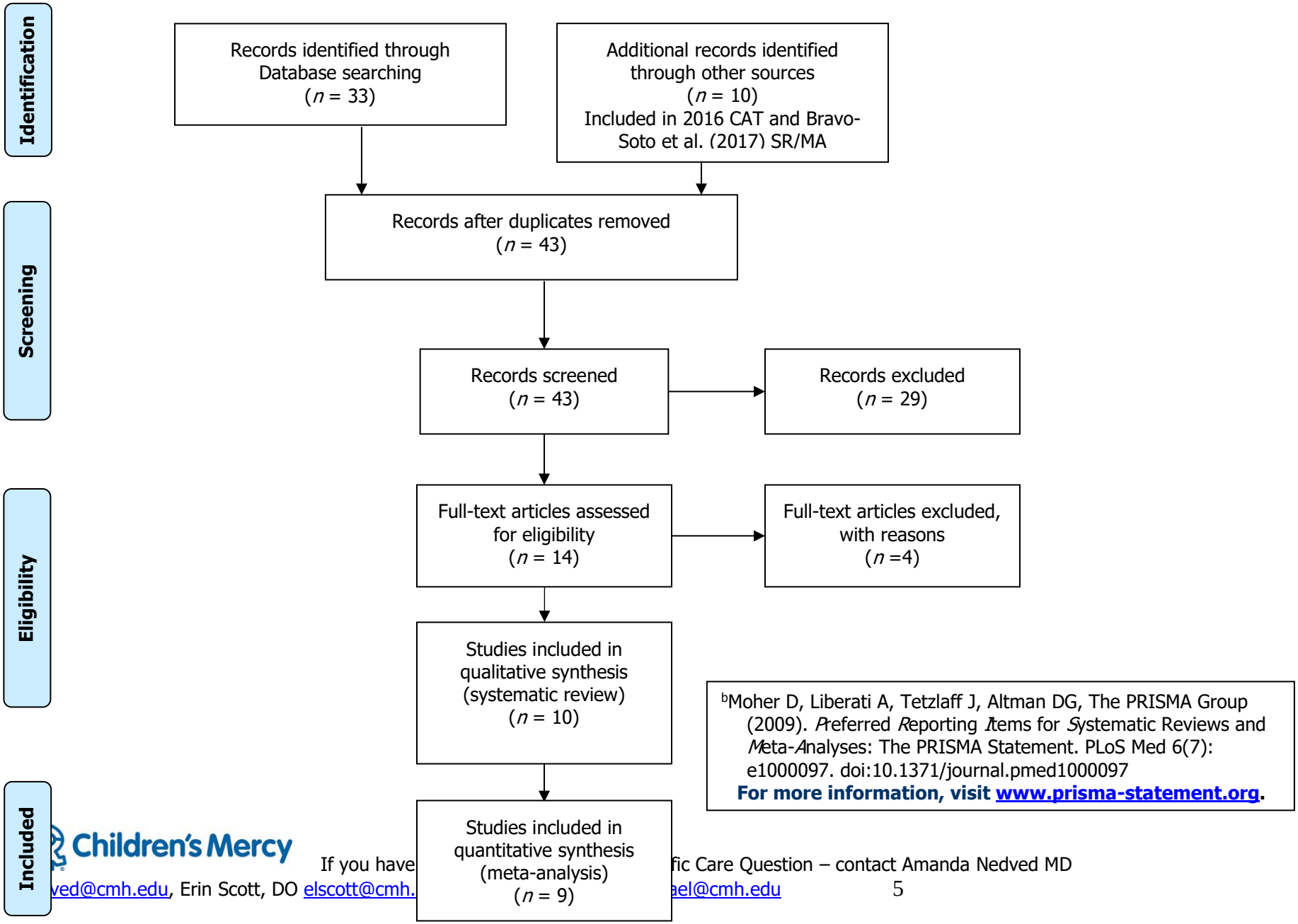
Acronyms Used in this Document

Acronym	Explanation
ED	Emergency Department
CPG	Clinical Practice Guideline
ACTH	Adrenocorticotropic hormone
CS	Corticosteroids
CDSR	Cochrane Database Systematic Reviews
CMH CAT	Children's Mercy Hospital Critically Appraised Topic
HPA	Hypothalamic pituitary adrenal
IQR	Interquartile range
LOS	Length of stay
OR	Odds ratio
PRAM	Pediatric Respiratory Assessment Measure
PSAS	Patient Self-Assessment Score
RCT	Randomized controlled trial
RSV	Respiratory syncytial virus

Date Developed/Updated: August 2018

Figure *1. Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRIMSA)*[b]



[b]Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group (2009). *P*referred *R*eporting *I*tems for *S*ystematic Reviews and *M*eta-*A*nalyses: The PRISMA Statement. PLoS Med 6(7): e1000097. doi:10.1371/journal.pmed1000097
For more information, visit www.prisma-statement.org.

Figure *2. Risk of Bias Summary*

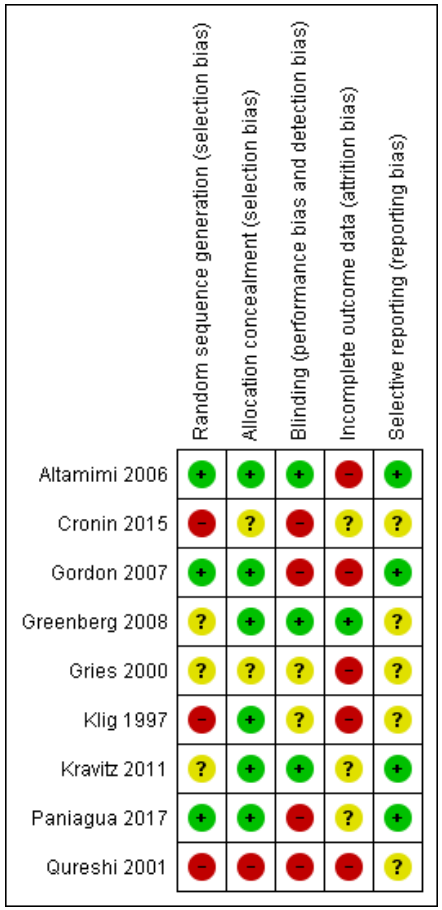


Table *1*
Summary of Findings Table:

Oral Dexamethasone Compared to Oral Prednisone/olone for Asthma Exacerbation in the ED/UCC											
Certainty assessment							**Summary of findings**				
№ of participant (studies) Follow-up	**Risk of bias**	**Inconsistency**	**Indirect-ness**	**Imprecision**	**Publi-cation bias**	**Overall certainty of evidence**	**Study event rates (%)**		**Relative effect (95% CI)**	**Anticipated absolute effects**	
							With Prednisone/olone	**With Dexamethasone**		**Risk with Prednisone/olone**	**Risk difference with Dexamethasone**
Admission at initial presentation											
1007 (3 RCTs)	serious [a]	serious [b]	not serious	serious [c]	none	⨁◯◯◯ VERY LOW	48/499 (9.6%)	63/508 (12.4%)	**OR 1.33** (0.90 to 1.99)	96 per 1,000	**28 more per 1,000** (9 fewer to 79 more)
Pulmonary score at discharge											
345 (2 RCTs)	serious [a]	very serious [d]	not serious	not serious	none	⨁◯◯◯ VERY LOW	169	176	-		MD **0** (0.29 lower to 0.29 higher)
Length of stay in ED											
667 (2 RCTs)	not serious	serious [e]	not serious	serious [f]	none	⨁⨁◯◯ LOW	330	337	-		MD **0.24 lower** (0.97 lower to 0.48 higher)

Relapse											
1734 (6 RCTs)	serious [g]	not serious [h]	not serious	serious [i]	none	⊕⊕◯◯ LOW	53/886 (6.0%)	38/848 (4.5%)	**OR 0.75** (0.49 to 1.16)	60 per 1,000	**14 fewer per 1,000** (30 fewer to 9 more)
Vomiting											
1558 (5 RCTs)	serious [j]	serious [k]	not serious	very serious [l]	none	⊕◯◯◯ VERY LOW	46/766 (6.0%)	17/792 (2.1%)	**OR 0.34** (0.19 to 0.59)	60 per 1,000	**39 fewer per 1,000** (48 fewer to 24 fewer)

CI: Confidence interval; **OR:** Odds ratio; **MD:** Mean difference

Explanations

a. Only one study clearly state randomization and allocation procedures.
b. There are only three studies, and two compare one dose of DEX to five days of PRED, while the other compares two doses of DEX vs five days of PRED. Doses differed.
c. Low number of subjects, and low number of events decreases the precision of the findings.
d. Different 'Pulmonary Scores' were used. Cronin (2015) used the valid PRAM score and Altamimi (2006) used a modified PSAS score that was adapted, but no evidence of psychometrics to test validity or reliability was found.
e. Only two studies for this outcome, one used one dose of DEX, the other two doses and both compared to 5 days of PRED
f. Overall in the two studies, the length of stay in the IM DEX group was 14 minutes shorter.
g. Two studies reported randomization clearly, the other four did not. Only one study performed intention to treat analysis
h. Two studies compared one dose DEX to five days of PRED, while four studies compared two days of DEX vs five days of PRED. Also definitions of relapse varied among the studies.
i. There are low number of relapses in the included studies
j. Randomization did not occur in two of the five included studies, and only one of the included studies clearly used intention to treat analysis.
k. The studies compared different doses and different dosing schedules. The different dosing schedules allowed 2 opportunities to vomit in the DEX group, while the PRED group had up to 10 opportunities to vomit.
l. Vomiting was not the primary outcome variable in any of the studies. Many studies excluded subjects who vomited in the ED. Studies were not powered to find differences in vomiting.

Table 2
Summary of Findings Table:

Intramuscular dexamethasone compared to oral prednisone/olone asthma exacerbation in the ED/UCC											
Certainty assessment							**Summary of findings**				
№ of participants (studies) Follow-up	**Risk of bias**	**Inconsistency**	**Indirectness**	**Imprecision**	**Publication bias**	**Overall certainty of evidence**	**Study event rates (%)**		**Relative effect (95% CI)**	**Anticipated absolute effects**	
							With PO prednisone/ olone	**With IM dexamethasone**		**Risk with PO prednisone/ olone**	**Risk difference with IM dexamethasone**
Relapse											
186 (2 RCTs)	serious [a]	serious [b]	not serious	very serious [c,d]	none	⨁◯◯◯ VERY LOW	11/94 (11.7%)	10/92 (10.9%)	**OR 0.94** (0.38 to 2.30)	117 per 1,000	**6 fewer per 1,000** (69 fewer to 117 more)
Vomiting											
186 (2 RCTs)	serious [a]	serious [b]	not serious	very serious [c,d]	none	⨁◯◯◯ VERY LOW	6/95 (6.3%)	0/91 (0.0%)	**OR 0.07** (0.00 to 1.35)	63 per 1,000	**58 fewer per 1,000** (63 fewer to 20 more)

CI: Confidence interval; **OR:** Odds ratio

Explanations

a. The Gordon 2007, which provides ~95% of the weight of the MA was not blinded, nor did they include subjects who were admitted to the hospital in the analysis. Approximately 20% of the subjects were admitted to the hospital, and it appears balanced across the two groups.
b. The doses of IM dexamethasone varied from .3 mg/kg to .6 mg/kg. For the prednisone group only the maximum varied it was 50 mg in one study and 100 mg in the other.
c. Relapse was the primary outcome for Klig 1997, but not for Gordon 2007. Gordon provides ~95% of the weight for the meta-analysis.
d. There are very low number of events, either Relapse or Vomiting.

Table *3*

Characteristics of Studies

Aljebab 2017

Methods	Cohort study
Participants	**Participants:** Children suffering from asthma or croup, prescribed oral prednisolone or dexamethasone and able to understand the study's palatability scale and communicate their response were approached for the study. Children in the study either had asthma or croup. **Setting:** Emergency room of two pediatric EDs • Gurayat General Hospital in Saudi Arabia • Derbyshire Children's Hospital in the UK **Number enrolled:** Total *N* = 255 • Saudi Arabia: *n* = 122 ○ **Group 1:** Prednisolone base tablet, *n* = 52 ○ **Group 2:** Prednisolone sodium phosphate syrup, *n = 37* ○ **Group 3:** Dexamethasone elixir, *n* = 33 • United Kingdom, *n* = 133 ○ **Group 1:** Prednisolone base tablet, *n* = 38 ○ **Group 2:**Prednisolone sodium phosphate soluble tablet, *n* = 42 ○ Dexamethasone sodium phosphate solution, *n* = 53 **Age, years (Median, [IQR]):** • Saudi Arabia ○ **Group 1:** Prednisolone base tablet, 4.5, [3,6] ○ **Group 2:**Prednisolone sodium phosphate syrup, 4, [3-5] ○ **Group 3:** Dexamethasone elixir, 3.5, [3, 4.75] • United Kingdom ○ **Group 1:** Prednisolone base tablet, 5, [3.38, 7.5] ○ **Group 2:** Prednisolone sodium phosphate soluble tablet, 4, [3,7] ○ **Group 3:** Dexamethasone sodium phosphate solution, 3, [2.5,5] **Inclusion criteria:** • Children with asthma or croup • Less than or equal to 12 years of age in Saudi Arabia • Children ages 2-18 years in the UK **Exclusion criteria:** • Patients >18 years of age **Covariates identified:** • Gender • Weight (kg)

	• Dose (mg/kg/day) • Dose duration (day) • Received oral steroids before (Y/N)

Interventions	• Saudi Arabia
	  ○ **Group 1:** Prednisolone base tablet, 2 mg/kg/d times 3 days
	  ○ **Group 2:** Prednisolone sodium phosphate syrup, 2 mg/kg/d times 3 days
	  ○ **Group 3:** Dexamethasone elixir, 0.3 mg/kg/d times 1 day, 3.5 years
	• United Kingdom
	  ○ **Group 1:** Prednisolone base tablet, 1.2 mg/kg/d times 3 days
	  ○ **Group 2:** Prednisolone sodium phosphate soluble tablet, 1.1 mg/kg/d times 3 days
	  ○ **Group 3:** Dexamethasone sodium phosphate solution, 0.2 mg/kg/d times 1 day

Outcomes	**Primary outcome:** **Palatability:** 5-point facial Hedonic Scale (1= dislike very much, 2= dislike a little, 3= not sure, 4= like a little, 5= like very much) to assess palatability. If the patient was too young to select a face on the Hedonic Scale, parent were asked to interpret their child's perception of the taste. No mention of reliability or validity of the scoring tool. **Secondary analysis:** Tolerability, as reported by patients or parents 30 to 60 minutes after medication was given. For younger children who could not self-report, parents were asked if there was a change in their child's state which could be an indicator of nausea. Specifically parents were asked about dizziness, lethargy, or being cold and clammy. Both the primary and secondary outcomes were evaluated after each dose. The first dose in the ED, subsequent doses were evaluated by telephone call, or data was recorded on a form and mailed into the center.
Notes	**Results:** • In both countries, dexamethasone had the highest palatability scores, while prednisolone base tablets had the lowest. • Although prednisolone base tablets received the lowest palatability scores, the palatability score improved for all formulations with each subsequent daily dose. • Children in Saudi Arabia experienced more nausea and vomiting with prednisolone base tablets vs. sodium phosphate syrup. All subjects who received dexamethasone in this group were steroid naïve. • Children in the UK experienced vomiting more frequently with prednisolone base than sodium phosphate soluble tablets. • In both countries, dexamethasone was associated with less side effects. • Vomiting, nausea, and abdominal pain occurred more with dexamethasone sodium phosphate solution than dexamethasone elixir.

Altamimi 2006

Methods	RCT

Participants	**Setting:** An urban ED in British Columbia, Canada **Randomized into study:** *N* = 134 • **Group 1:** Dexamethasone *n* = 67 • **Group 2:** Prednisone *n* = 67 **Completed Study:** *N*= 110 • **Group 1:** Dexamethasone *n* = 56 • **Group 2:** Prednisone *n* = 54 **Gender, males:** • **Group 1:** Dexamethasone *n* = 43 (64%) • **Group 2:** Prednisone *n* = 43 (64%) **Age, years** (mean) (SD): • **Group 1:** Dexamethasone *n* = • **Group 2:** Prednisone *n* = **Inclusion Criteria:** • Age 2-6 years with mild to moderate asthma • At least one episode of "asthma like" symptoms • Mild to moderate asthma defined as Pulmonary Index Score (PIS) less than 9 and PEFR of 60% or more of predicted value for height **Exclusion Criteria:** • Severe asthma defined as PIS >10, • Use of oral steroids in the past 2 weeks • Complete recovery after first salbutamol treatment **Power Analysis:** Non-inferiority was accepted if single does oral Dexamethasone was no worse than one extra day in producing a PSAS score to return to baseline or PEFR to return to 80% predicted value for height. Sample size of 134 subjects, with 67 in each group was required to detect and alpha of 0.1 with 95% confidence.
Interventions	• **Group 1:** Dexamethasone 0.6 mg/kg to a maximum of 18 mg, oral solution in the ED and placebo X 4 days at home • **Group 2:** Prednisone (1 mg/kg to a maximum of 30 mg), oral solution in the ED and (1 mg/kg to a maximum of 30 mg) X 4 days at home
Outcomes	**Primary outcome(s):** PSAS score to return to baseline or PEFR to return to 80% predicted value for height. **Secondary outcome(s):** Time to ED discharge, initial admission rate, return to ED with worsening symptoms.
Notes	This article is included for the outcome vomiting, however two subjects were excluded due to vomiting. It is not clear which group to which they were assigned.

Risk of bias table

Bias	Scholar's judgment	Support for judgment
Random sequence generation (selection bias)	Low risk	
Allocation concealment (selection bias)	Low risk	
Blinding of outcome assessment (detection bias)	Unclear risk	Not reported if personnel making the follow-up calls were blinded
Incomplete outcome data (attrition bias)	High risk	They powered the study for 67 enrolled in each group, but had inherent drop out points. Did not meet power at time of analysis and analysis was by per protocol
Selective reporting (reporting bias)	Low risk	
Other bias	High risk	Competing nurse projects implemented at the same time as the study started, patients were quickly treated with beta agonists and oral steroids prior to study enrollment

Bravo-Soto 2017

Methods	**Quantitative Synthesis (meta-analysis) -**Systemic corticosteroids, typically oral prednisone, constitute the cornerstone in the treatment of asthmatic exacerbation in children. However, there is concern about their adverse effects in both the short- and long-term. Dexamethasone allows administration for a shorter period of time, which would reduce adverse effects and costs. It is not clear, however, whether its efficacy is similar.
Participants	**Protocol and registration** Not given **Study Selection** Ten primary studies were included. **Eligibility Criteria** • Included studies were reported upon in six previously published systematic reviews. • All were randomized control trials in pediatric subjects. • The age range of participants in the included studies 0.5 - 18 years of age. Subjects had a history of a clinical episode of wheezing (three studies), or a history of two or more episodes of wheezing (two studies), or history of previous asthma (three studies). • Asthma exacerbations could be mild or moderate acute exacerbations (four studies), or moderate exacerbation only (one study). • Three studies excluded life-threatening exacerbation, need of intubation, or previous history of severe acute asthma exacerbation or need of intubation.

	• Other exclusion criteria a) if subjects received CS within the last two weeks, b) presence of chronic comorbidity, and c) exposure to tuberculosis, chicken pox, and RSV infection. **Information sources** Epistemonikos Database **Search** Epistemonikos database, which is maintained by screening multiple information sources, to identify systematic reviews and their included primary studies. **Data collection process** Not given. **Risk of Bias across studies**
Interventions	**Intervention group** • All trials used Dexamethasone • It was administered orally in 4 trials, intermuscular in 3 and nebulized in 1 • In five trials the treatment lasted one day • In two trials it lasted two days • Not able to get information in one trial **Control Group** • Three trials compared prednisolone • Five trials compared against prednisolone • The comparison was oral in all trials • The dose was from 1-2 mg/kg/day • The duration of treatment was 3-5 days for 6 trials • Two days for one trial • Unable to obtain information from 1 trial
Outcomes	**Summary measures reported as risk ratios, NOT odds ratios** • Hospitalization at first consultation. • Relapse, defined as revisit to doctor or emergency service • Admission during relapse • Asthma symptoms measured on PIS scale (Pulmonary InDEX Score), PSAS (Patient Self-Assessment Score) or PRAM (Pediatric Respiratory Assessment Measure) • Adverse effect: vomiting • Severe adverse effects • Time to complete recovery
Notes	For the outcome: • Hospitalization at first consultation -three trials, 1007 subjects • Relapse - eight trials - 1280 subjects • Vomiting- five trials -1112 subjects

Cronin 2015

Methods	Randomized controlled trial

Participants	**Setting:** Emergency department of Our Lady's Children's Hospital, Crumlin in Dublin, Ireland
	Randomized into study: *N* = 250
	• **Group 1:** Dexamethasone *n* = unknown
	• **Group 2:** Prednisone *n* = unknown
	Completed Study *N* = 245
	• **Group 1:** Dexamethasone *n* = 123
	• **Group 2:** Prednisone *n* = 122
	Gender, males:
	• **Group 1:** Dexamethasone *n* = 76 (61.8%)
	• **Group 2:** Prednisone = 91 (74.6%)
	Age, years (mean)
	• **Group 1:** Dexamethasone 5.65
	• **Group 2:** Prednisone 5.76
	Inclusion criteria:
	• Aged 2-16 years
	• History of asthma
	  ○ At least 1 previous episode of beta-agonist-responsive wheeze or a previous diagnosis of asthma made by a pediatrician or clinician of comparable experience
	• Present to ED with acute asthma exacerbation
	  ○ Includes all the following clinical features:
	  ▪ Dyspnea
	  ▪ Wheeze
	  ▪ Acute cough
	  ▪ Increased work of breathing
	  ▪ Increased requirement of beta-agonist from baseline
	  ▪ SaO2 less than 95%
	Exclusion Criteria:
	• Children with critical or life-threatening asthma exacerbation
	• Active varicella or herpes complex infection
	• Documented concurrent infection with RSV
	• Temperature above 39.5 degrees
	• Use of systemic corticosteroids in the previous 4 weeks
	• Concurrent stridor
	• Galactose malabsorption
	• History of TB exposure

	• Significant comorbid disease **Power analysis:** The sample size calculation comparing DEX and PRED at day 4 assumed that DEX is non-inferior to PRED if the mean PRAM score at day 4 for the DEX group was not more than 1 point higher than for the PRED group. Assuming a similar effectiveness for DEX and PRED a sample size of 210 (105 subjects per group) would be sufficient to conclude non-inferiority with a probability (power) of 90%.
Interventions	**Group 1**: single dose of oral DEX 0.3mg/kg (max dose 12 mg) **Group 2**: 3-day course of once-daily PRED 1mg/kg per day (max dose of 40mg) given in tablet form swallowed whole or dissolved in water • Received first dose in the ED (day 1 enrollment) • Those who vomited medication in ED within 30 minutes were given a second dose • study packs given with instructions for giving remaining PRED at home • instructions for beta-agonist use given • asthma diary given • Day 4 of enrollment participants were evaluated in ED with scripted questionnaire ○ PRAM score • Telephone call on day 14 to assess secondary outcomes with scripted questionnaire

Outcomes	**Primary Outcome:**
	• Mean PRAM score at day 4.
	  ○ day 3 or 5 if they could not make day 4
	Secondary Outcomes:
	• Change in PRAM score from:
	  ○ ED arrival to follow-up
	  ○ ED discharge to hospital admit on day 1
	• Length of stay in ED
	• Unscheduled visits to healthcare provider for asthma
	• Respiratory symptoms within 14 days of study enrolment
	• Re-admission to hospital after ED discharge and within 14 days of study enrollment
	• Administration of further systemic steroids with 14 days
	• Number of salbutamol therapies administered after enrollment
	• Incidence of vomiting within 30 minutes compared between 2 groups
	• School and parental work days missed
	• Days of restricted activity

Notes	There is a discrepancy between those who were randomized and those who completed the study.

Risk of bias table

Bias	Scholar's judgment	Support for judgment
Random sequence generation (selection bias)	High risk	Unclear as to who was randomized into each group and completed study
Allocation concealment (selection bias)	Unclear risk	Not given in study
Blinding of outcome assessment (detection bias)	Unclear risk	Open label study
Incomplete outcome data (attrition bias)	Unclear risk	250 subjects enrolled, 235 completed the study
Selective reporting (reporting bias)	Unclear risk	Not all had primary outcome measured on day 4
Other bias	Unclear risk	

Gordon 2007

Methods	RCT
Participants	**Setting:** urban tertiary care center **Randomized:** *N* = 181 **Group 1:** IM Dexamethasone group *n* = 88 **Group 2:** Oral prednisolone *n*= 93 **Completed:** **Group 1:** IM Dexamethasone group *n* = 62 completed to 96-120 hour assessment **Group 2:** Oral prednisolone *n*= 64 completed to the 96-120 hour assessment **Gender:** (% male) **Group 1:** 54% Dexamethasone group and **Group 2:** 67% the prednisolone group **Inclusion:** • Age: > 18 months and <7 years of age • Asthma score of 3 to 7 (range of possible scores 0 to 9), indicating moderate asthma exacerbations **Exclusion:** • Used of systemic steroids within the last month • Allergy to any steroid medication • Known TB or varicella exposure, • Previous enrollment in the study

	• Co-existing conditions like heart disease, cystic fibrosis etc. SpO2< 88%, pectus excavatum • Need for an IV • Inability to return for follow up **Power analysis:** Not reported
Interventions	• **Group 1:** IM Dexamethasone Dose: 0.6 mg/kg/ to a maximum of 15 mg while in the ED. No other corticosteroids were administered. • **Group 2:** oral prednisolone 2 mg/kg/ to a maximum of 50 mg while in the ED. They were prescribed four additional daily doses of the same amount at discharge. If subjects vomited within 30 minutes received a second oral dose. If subjects vomited again, they received 1 dose of IV methylprednisolone. A study endpoint was admission to the hospital from the initial ED visit. Admission was defined as > 6 hours stay in the ED after randomization. Subjects returned between 96 to 120 hours after enrollment. If the subject was unable to attend, a structured interview was done by telephone.
Outcomes	**Primary outcome:** change in Asthma Score from the initial score (ED presentation. Admission was defined if the subject had not been discharged from the ED by 6 hours after study enrollment) to the score assigned 96 to 120 hours later. **Secondary outcomes**: hospital admission on day of enrollment, hospitalization by 120 hours, and hospitalization by 2 weeks (ascertained by phone interview)
Notes	

Risk of bias table

Bias	Scholar's judgment	Support for judgment
Random sequence generation (selection bias)	Low risk	Randomized into the two groups in blocks of 6, 8, or 10
Allocation concealment (selection bias)	Low risk	Used opaque study packets that were only opened after assignment
Blinding of outcome assessment (detection bias)	High risk	Did not blind treating physicians, nor patients. There is no mention if personnel who made follow-up phone calls were blinded
Incomplete outcome data (attrition bias)	High risk	Per-protocol analysis- excluded patients who were admitted
Selective reporting (reporting bias)	Low risk	
Other bias	Low risk	

Greenberg 2008

Methods	RCT

Participants	**Setting:** Children 2-18 years of age with a history of asthma (2 or more episodes of wheezing treated with Beta agonists. Urban tertiary ED **Inclusion Criteria:** none stated **Exclusion Criteria:** • Use of oral steroids in the past month • History of intubation for a previous asthma exacerbation • Varicella exposure in the past 3 weeks • Possible foreign body aspiration • Any chronic lung disease (e.g., cystic fibrosis) that would affect the patient's management • Chronic heart, liver, or kidney disease • Significant respiratory distress necessitating airway intervention (e.g., intubation) • Previous enrollment in this study • No telephone for follow-up • ≥2 episodes of emesis after steroid administration in the ED.
Interventions	**Experimental:** 2 doses of oral Dexamethasone 0.6 mg/kg, maximum dose 16 mg- rounded to nearest 2 mg. **Control:** 5-day course of oral prednisone 2 mg/kg, maximum dose 80 mg. rounded to the nearest 5 mg.
Outcomes	**Primary outcome:** Relapse in 10 days **Secondary outcome:** Vomiting in the ED
Notes	There were more Caucasians in the dexamethasone group and more "others" in the prednisone group

Risk of bias table

Bias	Scholars' judgment	Support for judgment
Random sequence generation (selection bias)	Low risk	Block randomization < 7 years and > 7 years
Allocation Concealment (selection bias)	Low risk	
Blinding of outcome assessment (detection bias)	Low risk	Pharmacy prepared drugs to look identical as a white powder capsule.
Incomplete outcome data (attrition bias)	Low risk	
Selective reporting (reporting bias)	Unclear risk	

Gries 2000

Methods	RCT
Participants	**Setting:** Pediatric Clinic in the US **Randomized into study:** *N = 33* • **Group 1:** IM Dexamethasone *n* = 16 • **Group 2:** PO Prednisone *n* = 17 **Completed study:** • **Group 1:** IM Dexamethasone *n* = 15 • **Group 2:** PO Prednisone *n* = 17 **Gender, males:** • **Group 1:** IM Dexamethasone *n* = 10, (63%) • **Group 2:** PO Prednisone *n* = 7, (76%) **Age, months** (mean) (SD): • **Group 1:** IM Dexamethasone - 38 (18) • **Group 2:** PO Prednisone - 36 (22) **Inclusion Criteria:** • Children with mild to moderate asthma (definition - recurrent coughing, wheezing, or shortness of breath responsive to CS or SABA • Asthma exacerbation defined as increased asthma signs, unresponsive to usual medications, and requiring extra SABA therapy • Six months to 7 years of age • Were prescribed a short course of CS by the attending physician **Exclusion Criteria:** • Severe exacerbation requiring hospitalizations, without varicella exposure • History of CS admin within 2 weeks of in DEX visit • Fever > 101 degrees Fahrenheit • RSV **Power Analysis:** Performed. 16 subjects were required per group to detect a 2 point difference in the clinical score at day 5. 80% power and .05 significance level.
Interventions	• **Group 1:** IM Dexamethasone ○ 6 - 12 months- 16 mg IM DEX (1 cc) ○ 13-35 months - 24 mg IM DEX (1.5 cc) ○ ≥ 36 months - 36 mg IM DEX (2 cc) • **Group 2:** PO Prednisone - approximately 2 mg/kg/d for 5 days (suspension - 3mg/mL or tablet, subject's choice) ○ 6 - 12 months -10 mg PO PRED twice daily ○ 13-35 months - 15 mg PO PRED twice daily for 5 days

	○ ≥ 36 months - 20 mg PO PRED twice daily for 5 days
Outcomes	**Primary outcome(s):** • Change in clinical asthma score from days 1 through 5 • Clinical status returned to baseline • Albuterol use • Tolerance of CS medication - (no mention of vomiting) **Secondary outcome(s):** • Relapse - treatment with CS within 2 weeks of index visit **Safety outcome(s):** Adrenal function - urine for urinary cortisol:creatinine ratio
Notes	

Risk of bias table

Bias	Scholar's judgment	Support for judgment
Random sequence generation (selection bias)	Unclear risk	Just state they randomized, no method given
Allocation concealment (selection bias)	Unclear risk	Not reported
Blinding of outcome assessment (detection bias)	Unclear risk	Study personnel were blinded, parents and subjects were not blinded. Nurses who administered the IM injection did not discuss with investigators. Investigator blinding was successful in all but four subjects
Incomplete outcome data (attrition bias)	High risk	Per protocol analysis
Selective reporting (reporting bias)	Unclear risk	Primary outcome only reported as a graph, no numerical data available
Other bias	Unclear risk	

Klig 1997

Methods	Pilot study
Participants	**Setting:** Pediatric ED, Oakland CA **Randomized into study:** *N* = 44 • **Group 1:** IM Dexamethasone *n* = 23 • **Group 2:** Oral Prednisone *n* = 21 **Completed Study:** *N*= • **Group 1:** IM Dexamethasone *n* = 21

	• **Group 2:** Oral Prednisone *n* = 21 **Gender, males:** • **Group 1:** IM Dexamethasone *n* = 13 (52%) • **Group 2:** Oral Prednisone *n* = 11 (52 %) **Age, years** (mean) (SD): • **Group 1:** IM Dexamethasone - 82 months (46) • **Group 2:** Oral Prednisone - 63 months (36) **Inclusion Criteria:** • 3-16 years old • More than 2 previous episodes of wheezing treated with SABAs • All subjects were treated with nebulized albuterol (5 mg/ml solution) 0.5 cc in 2 cc or normal saline administered by oxygen face mask set at 6L flow. Thirty minutes after SABA treatment, PI score and pulse oximetry were obtained. Subjects with PI between 2 and 7 and a pulse oximetry saturation > 95% were enrolled. **Exclusion Criteria:** • Chronic disease (congenital heart disease, liver disease, bronchopulmonary dysplasia, immune disorders, endocrine disease, liver disease) • Recent significant wheezing exacerbation, (either hospitalization for asthma within last two months, or outpatient treatment with corticosteroids in the previous month) • History of severe exacerbation that required corticosteroid therapy for greater than seven days • Admission to an intensive care unit for asthma in the past year **Power Analysis:** Not reported
Interventions	• **Group 1:** IM Dexamethasone 0.3 mg/kg (15 mg maximum) • **Group 2:** Oral prednisone tablets 2 mg/kg (100 mg maximum), If the subject could not swallow pills, medication was crushed and mixed with applesauce. If oral prednisone was regurgitated within 30 minutes, it was re administered. Further, they were discharged with a 2-day supply of prednisone to administer twice a day, at a dose of 1 mg/kg/dose. Patients who had poor response to treatment or had evidence of hypoxia (oxygen saturation < 95%) were removed from the study and admitted to the hospital.
Outcomes	**Primary outcome(s):** Relapse **Secondary outcome(s):** PI score at discharge **Safety outcome(s):** Further CS use after ED discharge

Risk of bias table

Bias	Scholar's judgment	Support for judgment
Random sequence generation (selection bias)	High risk	Consecutive enrollment
Allocation concealment (selection bias)	Low risk	Used sealed packets, could not blind medication administration
Blinding of outcome assessment (detection bias)	Low risk	Those who called the families were blinded to group
Incomplete outcome data (attrition bias)	High risk	Two patients whose condition deteriorated in the ED were removed from the study.
Selective reporting (reporting bias)	Unclear risk	They misuse the term intention to treat. In the IM DEX group, they use the number of completers, not the number randomized.
Other bias	High risk	It is a pilot study

Kravitz 2011

Methods	RCT
Participants	**Setting:** Albert Einstein Medical Center and Temple University, Philadelphia PA, 2004-2007. The study was done in adults aged 18-45 years old. **Randomized into study:** *N* = 257 • **Group 1:** Dexamethasone *n* = 129 • **Group 2:** Prednisone *n* = 128 **Completed Study:** *N*= 200 • **Group 1:** Dexamethasone *n* = 104 • **Group 2:** Prednisone *n* = 96 **Gender, males:** • **Group 1:** Dexamethasone *n* = 40 (42%) • **Group 2:** Prednisone *n* = 42 (40%) **Age, years** (median) (IQR): • **Group 1:** Dexamethasone 28 (22 - 27) • **Group 2:** Prednisone 30 (23 - 38) **Inclusion Criteria:** • Age 18-45 years • Peak expiratory flow rate (PEFR) < 80% predicted **Exclusion Criteria:**

	• Received oral CS within the past four weeks • Chronic conditions -- chronic obstructive pulmonary disease, congestive heart failure, pneumonia, sarcoidosis, pregnant or breastfeeding • A history of CS allergy, tuberculosis, systemic fungal disease, gastritis, diabetes, unable to consent, or unable to be available for follow-up • Patients admitted to the hospital for their asthma exacerbation **Power Analysis:** calculations showed with 80% power and alpha = .05, and a 2-tailed test, assuming 80% of subjects would return to work in < three days, 88 subjects would be needed in each group to determine a minimum improvement of 15% in the Dexamethasone group.

Interventions	• All subjects were treated with 5 mg of nebulized albuterol and 2.5 mg of nebulized ipratropium bromide. All medications were packaged in a similar manner. There were five packets for each group. The first dose of either regimen below was taken in the ED, and packets were numbered 1-5, subjects were to take them in order.
	  ○ Group 1: Dexamethasone group -- received 5 medication packets. The first two contained 16 mg of oral Dexamethasone, and the remaining three contained placebo
	  ○ Group 2: Prednisolone group -- received 5 medication packets. Each contained 60 mg of prednisone

Outcomes	**Primary outcome(s):** Return to normal activity (days), determined by phone interview two weeks post ED visit **Secondary outcome(s):** Relapse - return to ED or primary care provider or admission to the hospital for worsening of asthma exacerbation within 2-week follow up period
Notes	

Risk of bias table

Bias	Scholar's judgment	Support for judgment
Random sequence generation (selection bias)	Unclear risk	They randomized 285, but 28 were excluded after randomization because they were admitted. It is not clear to which group these excluded subjects were randomized
Allocation concealment (selection bias)	Low risk	The pharmacy kept to codes
Blinding of outcome assessment (detection bias)	Unclear risk	
Incomplete outcome data (attrition bias)	Unclear risk	19% of the Dexamethasone group and 25% of the prednisone group were lost to follow-up. They perform per protocol analysis. There was also missing data for the primary outcome (days to return to normal) for nine subjects, six from the prednisone group and 3 from the Dexamethasone group.

Selective reporting (reporting bias)	Low risk	
Other bias	Low risk	

Paniagua 2017

Methods	RCT -- non-inferiority study **Definition of asthma** • Previous diagnosis of asthma OR • At least 2 previous episodes of B2 agonist- responsive wheeze OR • First episode of wheezing in children > 2 years old with a history of atopy **Definition of exacerbation** • Acute asthma that prompts an ED assessment • Symptoms include: ○ Dyspnea ○ Wheeze ○ Acute cough ○ Increased work of breathing AND/OR ○ increase use of short acting bronchodilators over usual use
Participants	**Setting:** acute care teaching tertiary hospital, Spain (Basque Country), Sept 2014-October 2015 **Randomized into study:** *N* = • **Group 1:** Dexamethasone, *n* = 294 • **Group 2:** Prednisone/olone, *n* = 29 **Completed Study:** *N*= • **Group 1:** Dexamethasone, *n* = 281 • **Group 2:** Prednisone/olone, *n* = 276 **Gender, males:** • **Group 1:** *n* = 169, (60.1%) • **Group 2:** *n* = 166 (60.1%) **Age, years** (mean) (SD): • **Group 1:** 4.7 (3.4) • **Group 2:** 4.5 (3.4) **Inclusion Criteria:** • Aged 1-14 years • Respiratory symptoms- ○ Cough, shortness of breath, tachypnea attributed to bronchospasm (wheezing, prolong expiration) ○ History of previous episodes

	Exclusion Criteria: • Other airway pathology • Other diseases that require hospitalization for safety • Need for stabilization of the airway **Power Analysis:** Sample size calculation based on a PACT score at day seven was not more than 6% of the score of the prednisone/olone group a sample size of 556 subjects.
Interventions	• Both groups treated with salbutamol (one dose) and did not respond, indicating the need for CS. Ipratropium administered per attending provider. If either treatment was vomited within 30 minutes, the dose was re-administered. ○ **Group 1:** Dexamethasone, oral, (1 mg/ml), 0.6 mg/kg, maximum 12 mg, one dose in the ED, one the following 24 hours ○ **Group 2:** Prednisone/prednisolone, oral, 1.5 mg/kg, maximum 60 mg, one dose in the ED, followed by 1 mg/kg/d, maximum 60 mg twice daily on days 2 - 5 post index visit. Choice of liquid or tablet formulate was based on the subjects age. Subjects were contacted by phone and the pediatric asthma control (PACT) questionnaire and the asthma related quality of life ARQoL instrument was completed. Both tools are validated.
Outcomes	Trial registered - clinicaltrialsregister.eu: 2013-003145-42, the registry states it is ongoing July 2 2018 **Primary outcome(s):** • Percent subjects with symptoms at 7 days [PACT score] and their quality of life score [ARQoL score]. **Secondary outcome(s):** • Admission rate • Unscheduled returns to ED • Hospital re-admissions • Visits to Primary Care Provider • School and work absenteeism
Notes	*****Any other relevant results not found in the data tables.

Risk of bias table

Bias	Scholars' judgment	Support for judgment
Random sequence generation (selection bias)	Low risk	Statisticians performed the randomization
Allocation concealment (selection bias)	Low risk	Randomization schedule was kept with the statisticians, and treatment group allocation was kept in opaque envelopes, they were opened sequentially after enrollment
Blinding of outcome assessment (detection bias)	Unclear risk	

Incomplete outcome data (attrition bias)	Low risk	Unclear if study personnel who made the follow up phone calls knew to which group the subjects had been allocated
Selective reporting (reporting bias)	Low risk	
Other bias	Low risk	

Qureshi 2001

Methods	PRCT used PEFR% to classify asthma severity or an "asthma score"
Participants	**Setting:** Urban pediatric hospital USA **Randomized:** *N*= 618 **Group 1:** Dexamethasone group: *n* = 309 **Group 2:** Prednisone group: *n* = 309 **Completed:** **Group 1:** Dexamethasone group: *n* = 272 (88%) **Group 2:** Prednisone group: *n* = 261 (82% **Gender:** **Group 1:** Dexamethasone group: 65% male **Group 2:** Prednisone: group: 66% male **Age: mean** Both groups: 6.5 years **Inclusion criteria:** • Known history of asthma (2 or more episodes of wheezing treated with beta agonists) • Greater than 2 years of age **Exclusion criteria:** • Reported use of any oral corticosteroid four weeks prior to the visit • History of intubation • Varicella exposure in the previous 3 weeks • Concurrent stridor • Possible presence of an intra-thoracic body • Chronic respiratory disease (cystic fibrosis) • Heart disease **Power analysis:** a sample size of 250 per group was needed to detect an absolute difference in relapse rate of 5% between groups. Power was met.
Interventions	• **Group 1:** Dexamethasone group: PO, even days- 0.6 mg/kg/ maximum of 16 mg of dexamethasone rounded to nearest 2 mg • **Group 2:** Prednisone group: (Prelone) odd days- 2 mg/kg with a maximum of 60 mg/d (liquid or tablet) rounded to nearest 5 mg

Outcomes	**Primary outcome:** • Rate of relapse within 10 days of enrollment in the study. **Secondary Outcomes:** • Rate of hospitalization from the initial visit and within 10 days • Frequency of vomiting • Medication compliance • Persistence of symptoms a • School and or work days missed.

Risk of bias table

Bias	Scholars' judgment	Support for judgment
Random sequence generation (selection bias)	High risk	Odd even day assignment to treatment
Allocation concealment (selection bias)	High risk	Odd even day assignment
Blinding of outcome assessment (detection bias)	Unclear risk	
Incomplete outcome data (attrition bias)	High risk	Only those discharged from the ED were included in the analysis, those subjects admitted to the hospital were not
Selective reporting (reporting bias)	Unclear risk	
Other bias	Unclear risk	

Table *4*
Corticosteroid Doses in Included Studies

Study	Dexamethasone dose	Prednisone/olone dose	Notes
Aljebab 2017	Dexamethasone elixir, 0.3 mg/kg/d, PO, times 1 day	Prednisolone base tablet, 2 mg/kg/d, PO, times 3 days Prednisolone sodium phosphate syrup, 2 mg/kg/d, PO, daily times 3 days	Saudi Arabia Maximum doses not reported
	Dexamethasone sodium phosphate solution, 0.2 mg/kg/d, PO, times 1 day	Prednisolone base tablet, 1.2 mg/kg/d, PO, daily times 3 days Prednisolone sodium phosphate soluble tablet, 1.1 mg/kg/d daily times 3 days	United Kingdom Maximum doses not reported
Altamimi 2006	Dexamethasone 0.6 mg/kg to a maximum of 18 mg, PO, times 1 day	Prednisone: 1 mg/kg to a maximum of 30 mg, PO, daily times 5 days	
Cronin 2015	Dexamethasone 0.3mg/kg (max dose 12 mg), PO, times one day	Prednisone 1mg/kg per day (max dose of 40mg) daily times 3 days	Tablet form swallowed whole or dissolved in water
Gordon 2007	Dexamethasone Dose: 0.6 mg/kg/ (maximum of 15 mg) IM, 1 day	Oral prednisolone 2 mg/kg/ to a maximum of 50 mg while in the ED, total of 5 doses.	
Greenberg 2008	Dexamethasone 0.6 mg/kg, (maximum dose 16 mg)- rounded to nearest 2 mg, PO, Daily times 2 days	Prednisone 2 mg/kg, (maximum dose 80 mg) rounded to the nearest 5 mg, PO, daily times 5 days	If subjects vomited within 30 minutes received a second oral dose.
Gries 2000	Dexamethasone • 6 - 12 months- dexamethasone 16 mg (1 cc), IM, times one day • 13-35 months - dexamethasone 24 mg (1.5 cc), IM, times one day • ≥ 36 months - dexamethasone 36 mg (2 cc), IM, times one day	Prednisone- approx. 2mg/kg/d • 6 - 12 months – prednisone, 10 mg PO twice daily, times 5 days • 13-35 months - prednisone, 15 mg PO, twice daily for 5 days • ≥ 36 months - prednisone, 20 mg PO, twice daily for 5 days	Subjects randomized to the prednisone group chose between suspension (3 mg/ml)
Klig 1997	Dexamethasone 0.3 mg/kg (15 mg maximum), IM, 1 dose	Prednisone, 2 mg/kg/d (100 mg maximum), PO, twice daily times 3 days	
Kravitz 2011	Dexamethasone 16 mg, PO, times 2 days	Prednisolone, 60 mg, PO, daily, times 5 days	
Paniagua 2017	Dexamethasone, 0.6 mg/kg (1 mg/ml), maximum 12 mg, PO, times 2 days	• Prednisone/prednisolone, 1.5 mg/kg, (maximum 60 mg), PO, times 5 days	Choice of liquid or tablet formulate was based on the subjects age.
Qureshi 2001	Dexamethasone group: 0.6 mg/kg/ maximum of 16 mg rounded to nearest 2 mg, PO, times 2 days	Prednisone group: 2 mg/kg with a maximum of 60 mg/d rounded to nearest 5 mg, PO, times 5 days	Liquid or tablet

Table *5*
Range of doses

Medication	Dose [Range], daily		Maximum [Range]	Number of doses
	If dosed as mg/kg/d	If dosed as total dose in mg	mg/d	Days
Dexamethasone	0.3 to 0.6	16 – 36 based on age 6-36 months	*Median* = 15, [12,18]	1 - 2
Prednisone/olone	1 to 2	10 – 20 based on age 6 - 36 months	Median = 60, [40, 80]	3 to 5

Table *6*
Comparison of Glucocorticoid Steroids

Glucocorticoid	Equivalent dose (mg)	Anti-inflammatory potency	Salt retention	Suppressive HPA potency	Biological half-life (hours)	Activity
Hydrocortisone (Ref.)	20	1	1	1	8-12	Short
Prednisone/olone	5	4	0.8	1	12-36	Intermediate
Dexamethasone	0.75	25	0	50	36-72	Long

Figure *3 Comparison: Oral Dexamethasone versus Oral Prednisone/olone, Outcome: Admission at Initial Presentation*

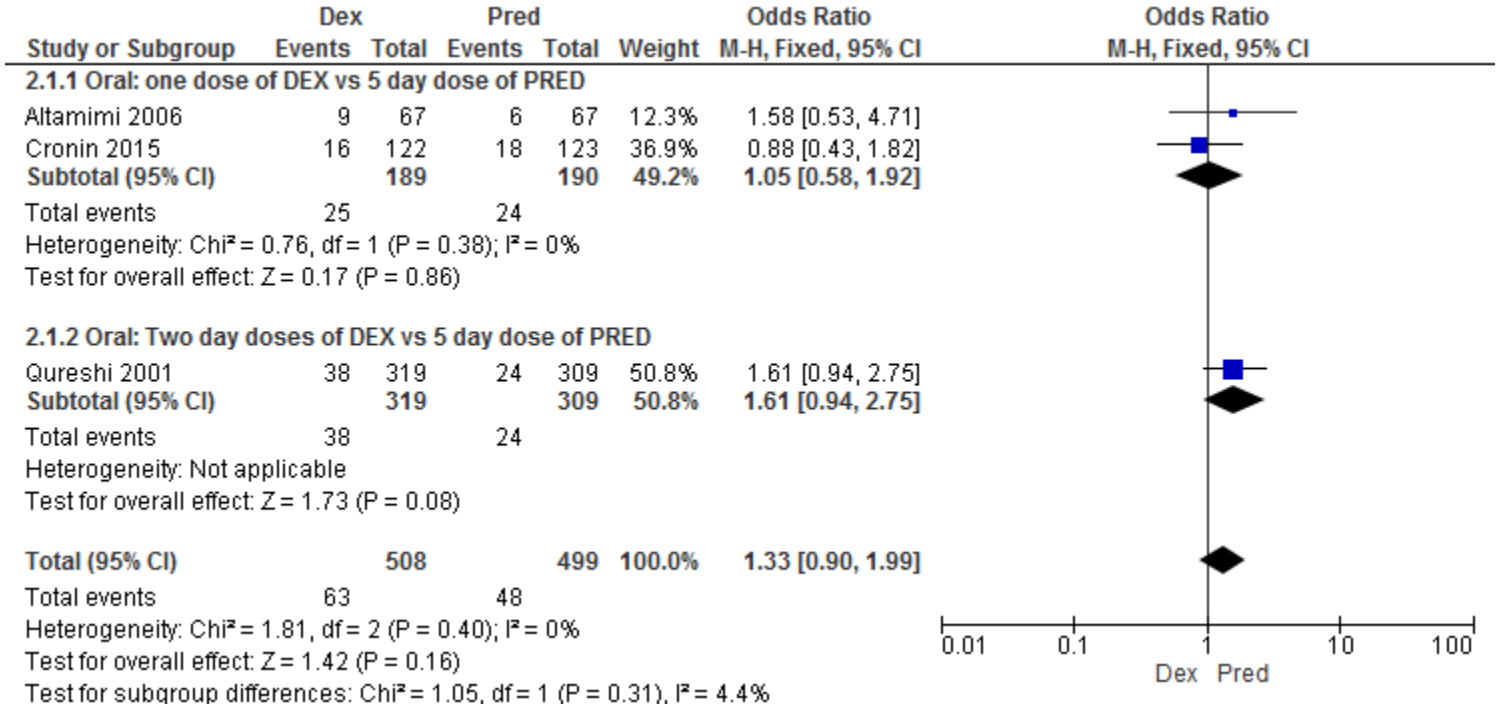


Figure *4 Comparison: Oral Dexamethasone versus Oral Prednisone/olone, Outcome*: Pulmonary Score at Discharge

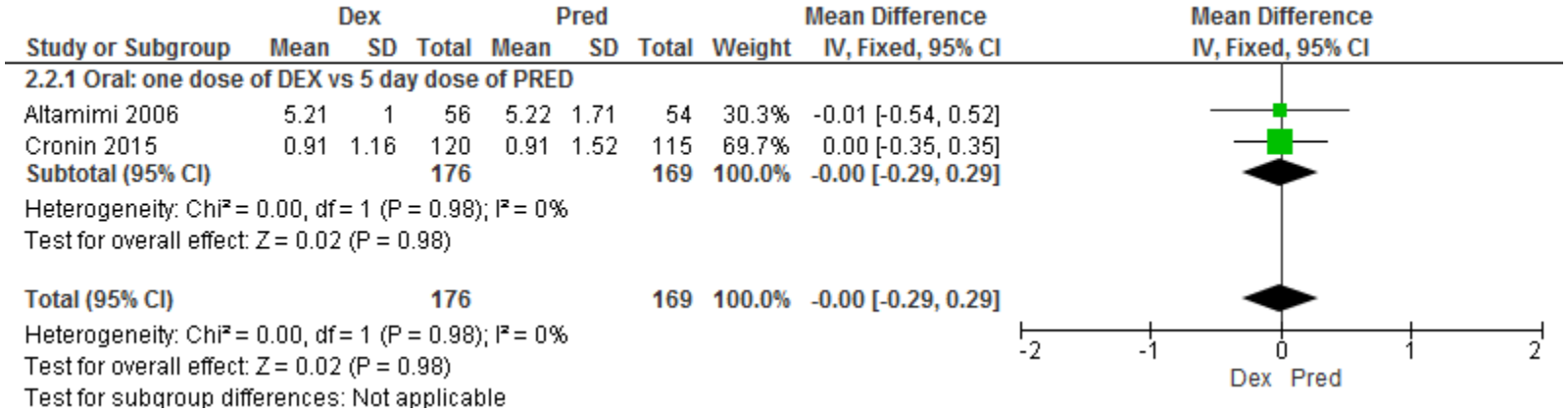


Figure *5 Comparison: Oral Dexamethasone versus Oral Prednisone/olone, Outcome*: Length of Stay in the ED

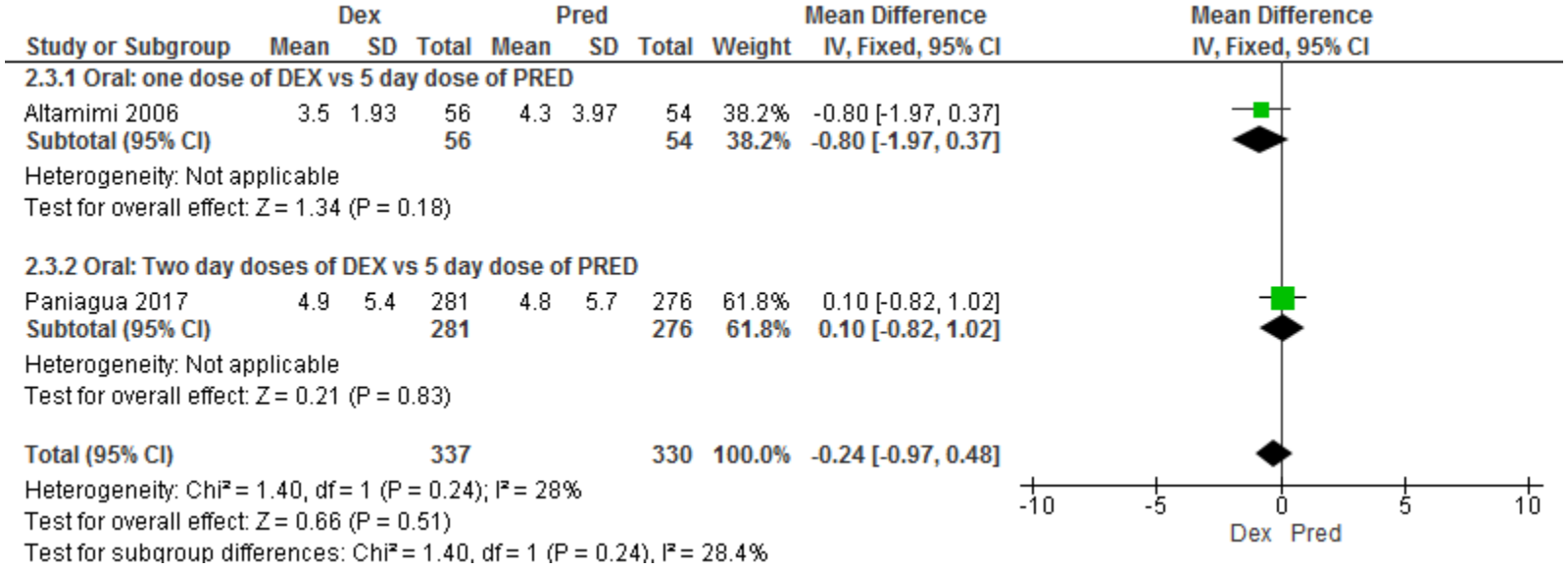


Figure *6 Comparison: Oral Dexamethasone versus Oral Prednisone/olone, Outcome*: PEFR at Discharge

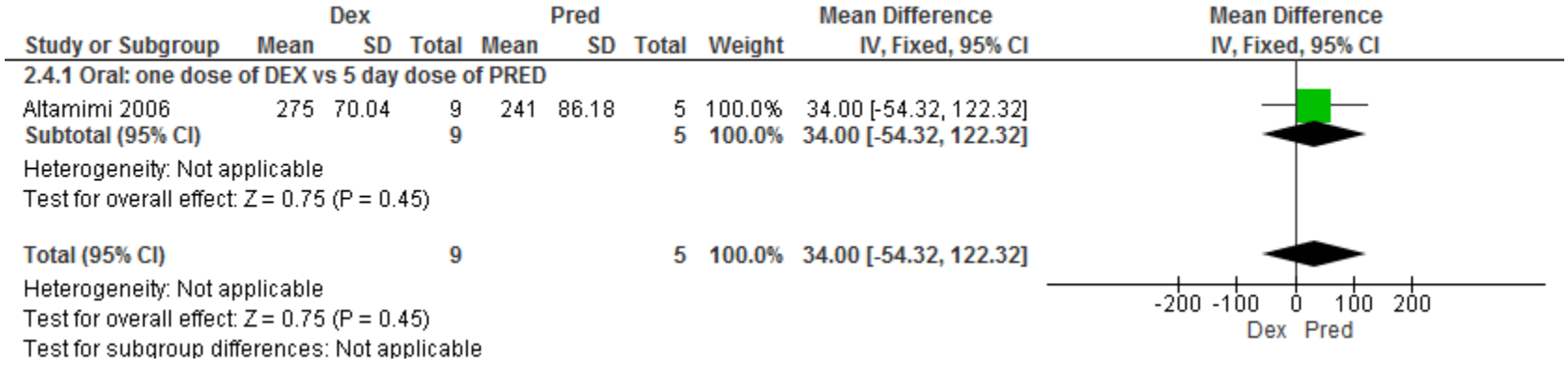


Figure *7 Comparison: Oral Dexamethasone versus Oral Prednisone/olone, Outcome*: Relapse

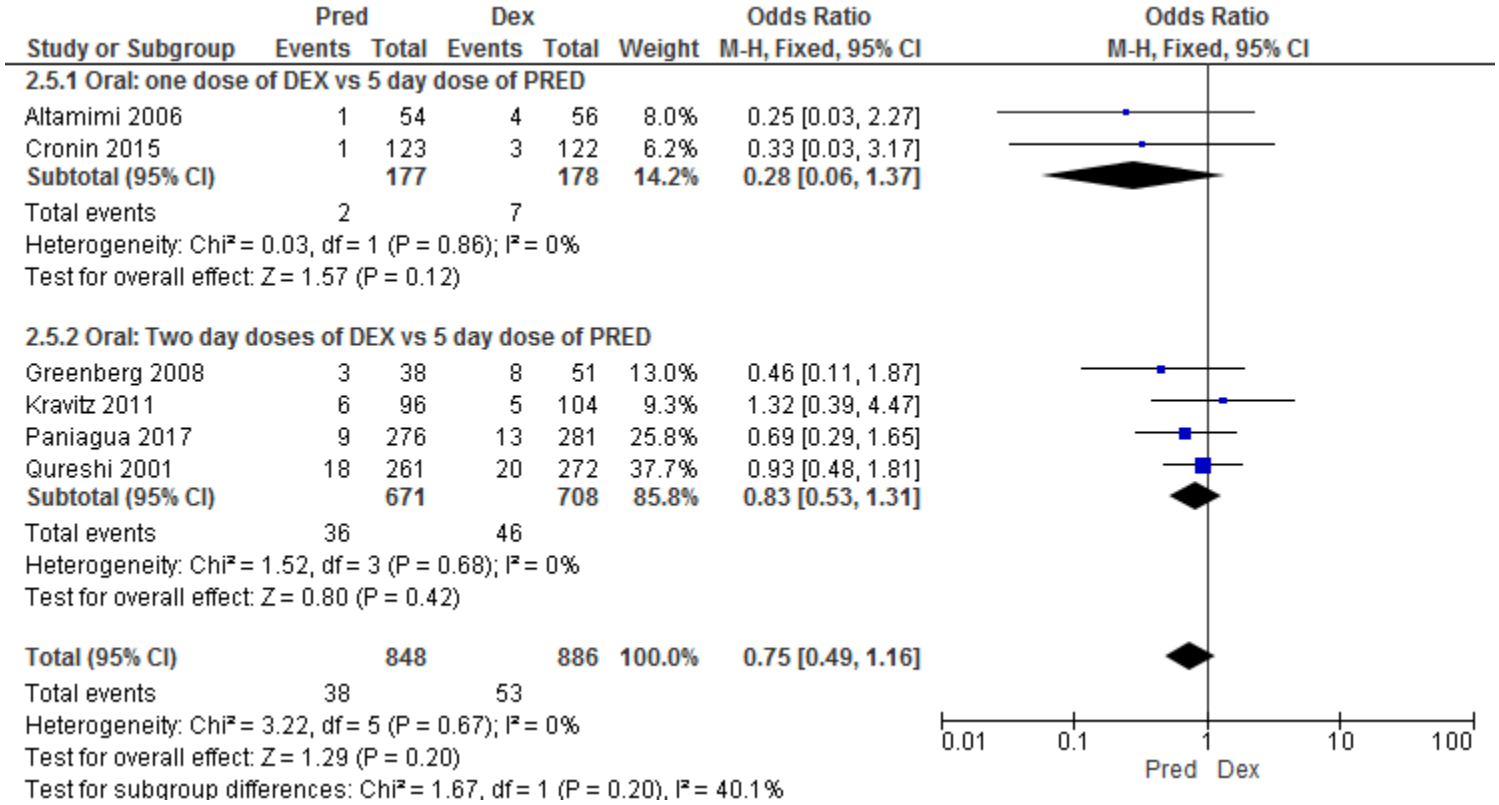


Figure *8 Comparison: Oral Dexamethasone versus Oral Prednisone/olone, Outcome*: Vomiting

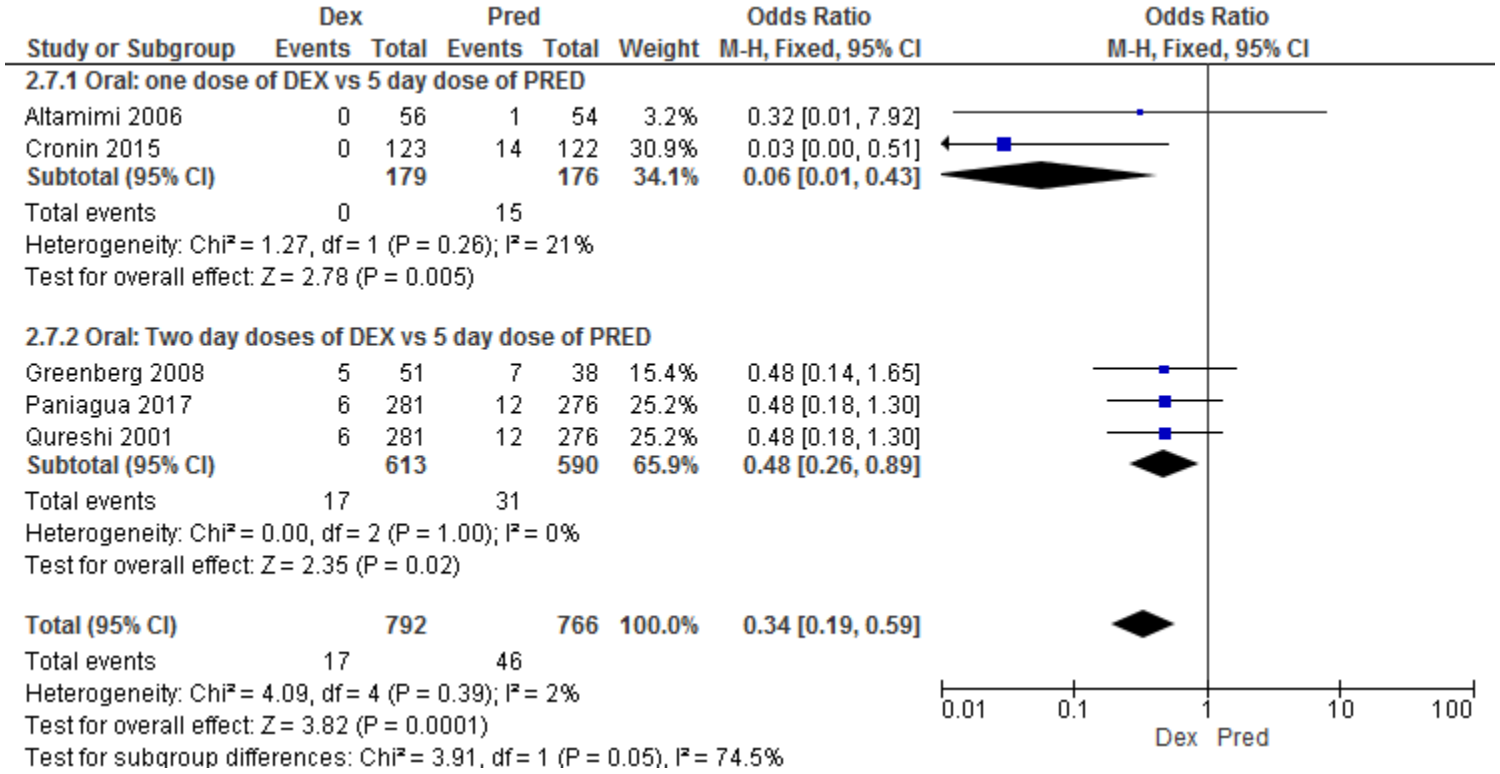


Figure *9 Comparison: IM Dexamethasone versus Oral Prednisone/olone, Outcome*: Relapse

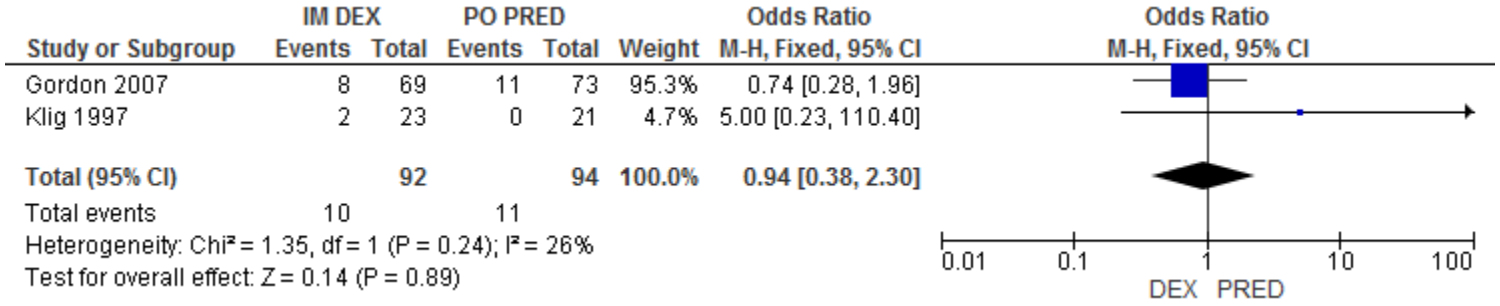
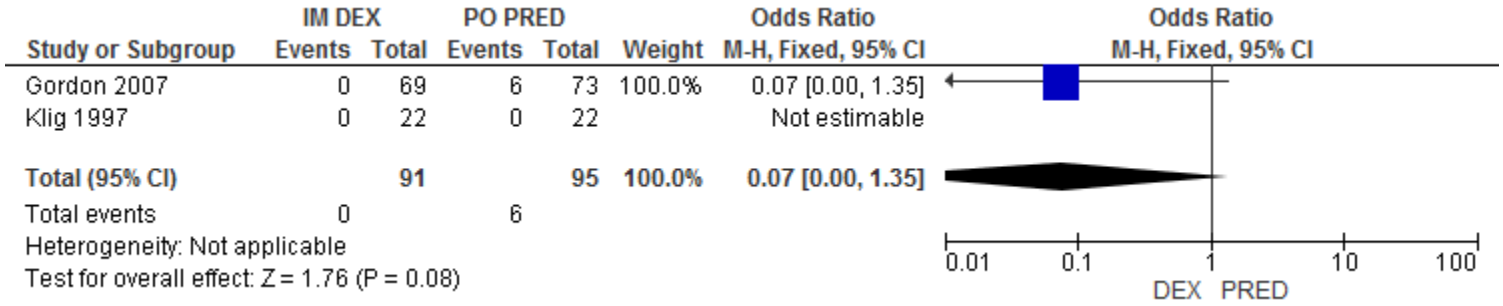


Figure *10 Comparison: IM Dexamethasone versus Oral Prednisone/olone, Outcome*: Vomiting



Office of Evidence Based Practice (EBP) – Critically Appraised Topic: Oral Dexamethasone vs. Prednisone for a Pediatric Asthma Exacerbation

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