Acute Asthma in the Emergency Room

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Potential Conflict of Interest:

In the last three years, I received honoraries for advisor and lectures sponsor by:

AstraZeneca, GlaxoSmithKline,
MerckSharpDhone, and Novartis.

Levels of evidence

1++	**High quality meta-analyses**, systematic reviews, or randomised controlled trials (RCTs) with a very low risk of bias
1+	Well-conducted meta-analyses, systematic reviews, or RCTs with a low risk of bias
1−	Meta-analyses, systematic reviews, or RCTs with a high risk of bias

Grades of recommendation

- Relate to strength of evidence, not clinical importance
- Low grade recommendations in important clinical areas should stimulate research

Recommendation	Evidence
A	**At least one 1++ directly applicable to target population*; or* Many studies 1+ directly applicable to target population and demonstrating consistency**

Introduction. Thorax 2003; 58 (Suppl I): i1-i92

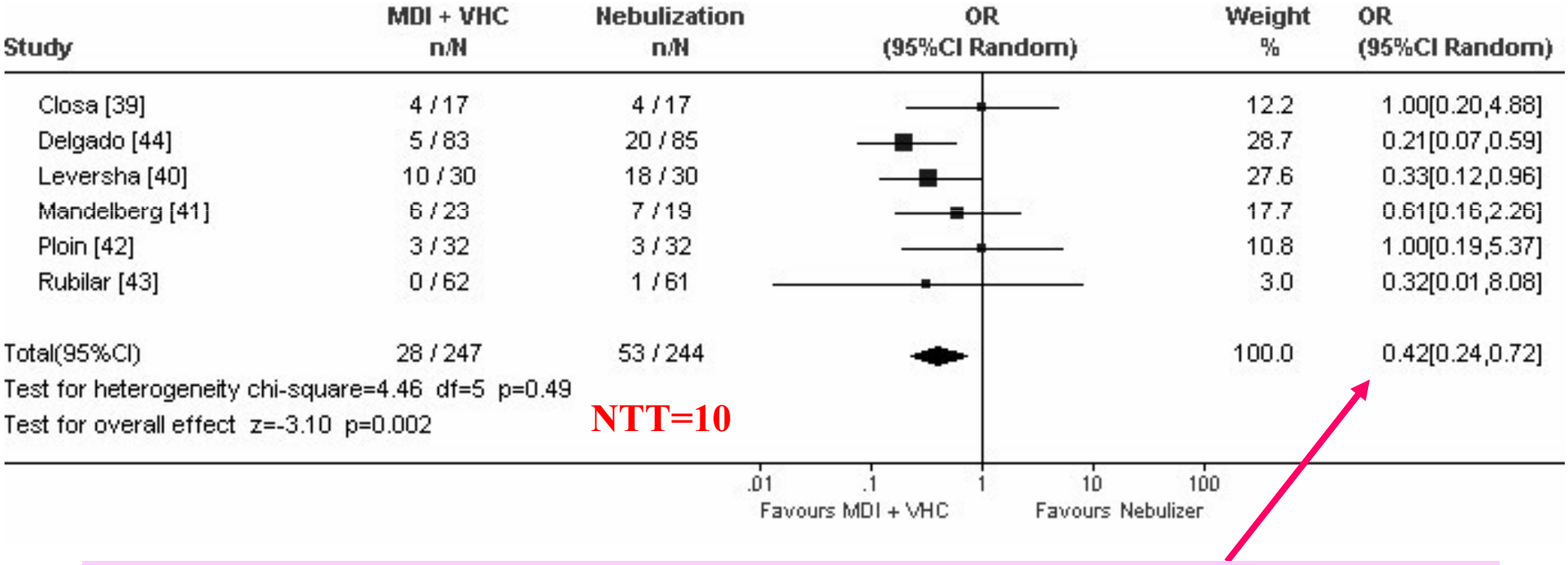
Management for Acute Asthma

- ✓ MDI vs. Nebulizer
- ✓ Type of spacer devices
- ✓ Salbutamol vs. Salbutamol+Bromuro Ipatropio
- ✓ Salbutamol vs. Leva-Salbutamol
- ✓ Oral Corticosteroids
- ✓ Systemic vs. Inhaled Corticosteroids
- ✓ Heliox vs. Oxygen for nebulization salbutamol

β-agonists by MDI+VHC vs. by Nebulizers for Acute Exacerbation of Wheezing or Asthma in Children under 5 yrs

6 RCT (n=491)

Need of Hospitalization:

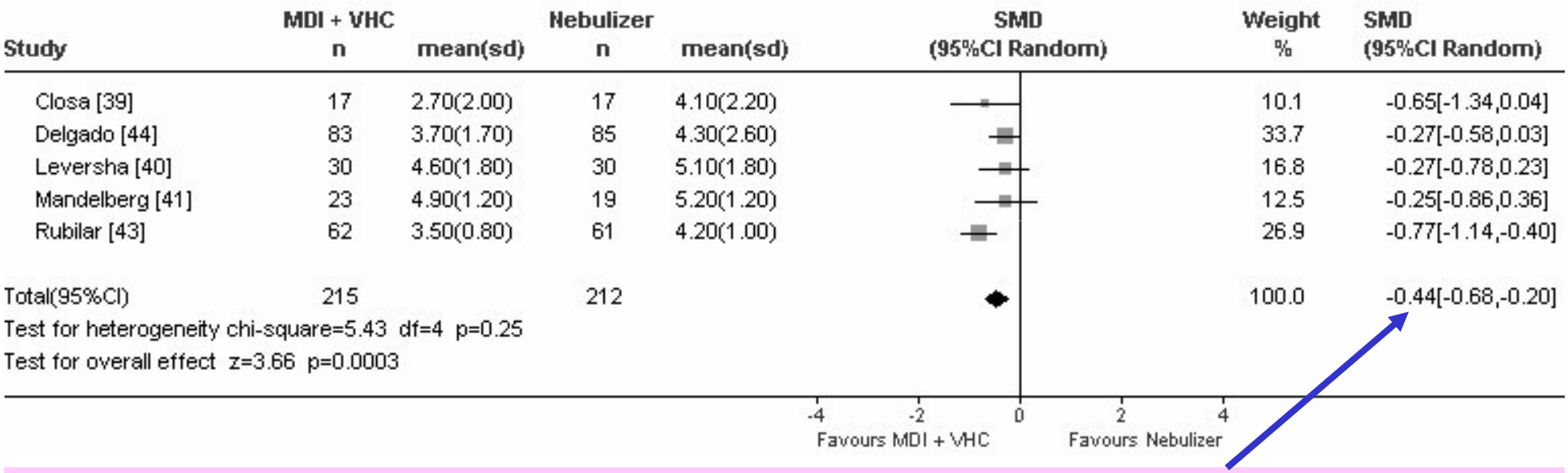


Risk of hospitalization is 58% less using β-agonists by MDI than by nebulizer

Castro-Rodríguez JA & Rodrigo G. J of Pediatr 2004;145:172-7

β-agonists by MDI+VHC vs. by Nebulizers for Acute Exacerbation of Wheezing or Asthma in Children under 5 yrs

Improvement of clinical score:



Improvement of clinical score is 36% more using β-agonists by MDI than by nebulizer

Castro-Rodríguez JA & Rodrigo G. J of Pediatr 2004;145:172-7

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Commercial versus home-made spacers in delivering bronchodilator therapy for acute therapy in children (Review)

THE COCHRANE COLLABORATION®

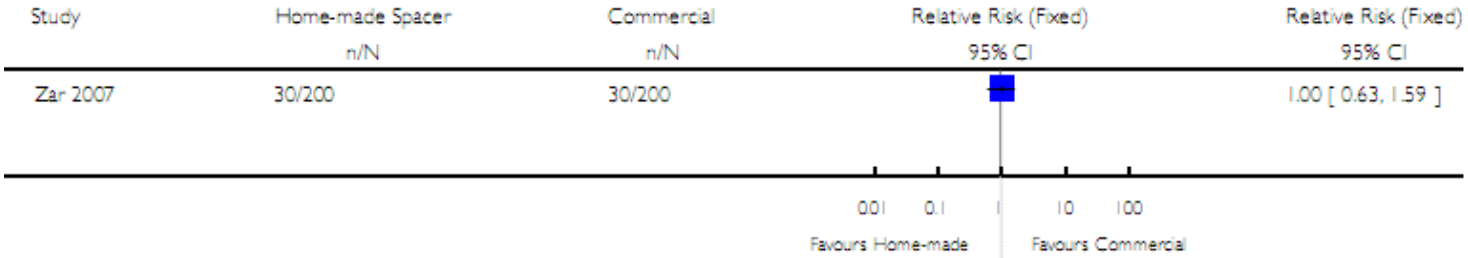
N=6 RCT
(n=658)

Analysis 01.01. Comparison 01 Home-made spacers versus commercial spacers, Outcome 01 Hospital admission

Review: Commercial versus home-made spacers in delivering bronchodilator therapy for acute therapy in children

Comparison: 01 Home-made spacers versus commercial spacers

Outcome: 01 Hospital admission

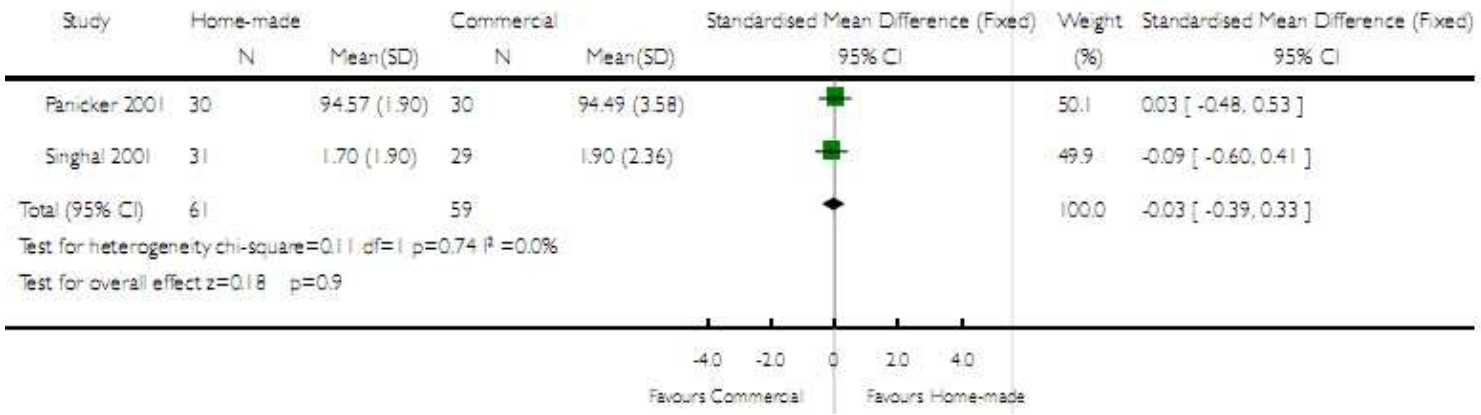


Analysis 01.02. Comparison 01 Home-made spacers versus commercial spacers, Outcome 02 O2 saturation (SaO2)

Review: Commercial versus home-made spacers in delivering bronchodilator therapy for acute therapy in children

Comparison: 01 Home-made spacers versus commercial spacers

Outcome: 02 O2 saturation (SaO2)



Rodriguez C et al. Cochr Data Base 2008

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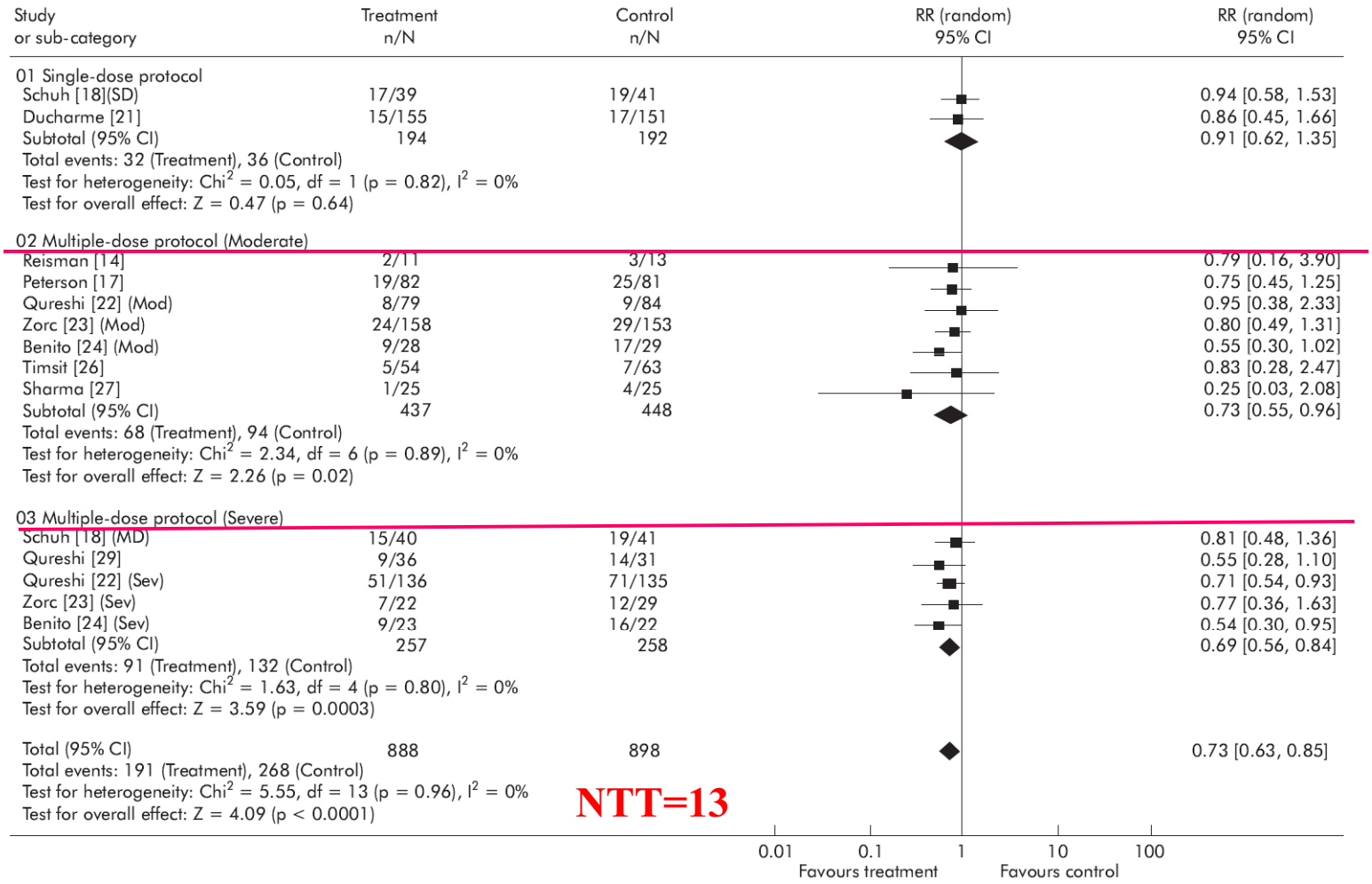
Combination of Anticholinergics to β2-agonits in Children with Acute Asthma

Less Hospital Admission

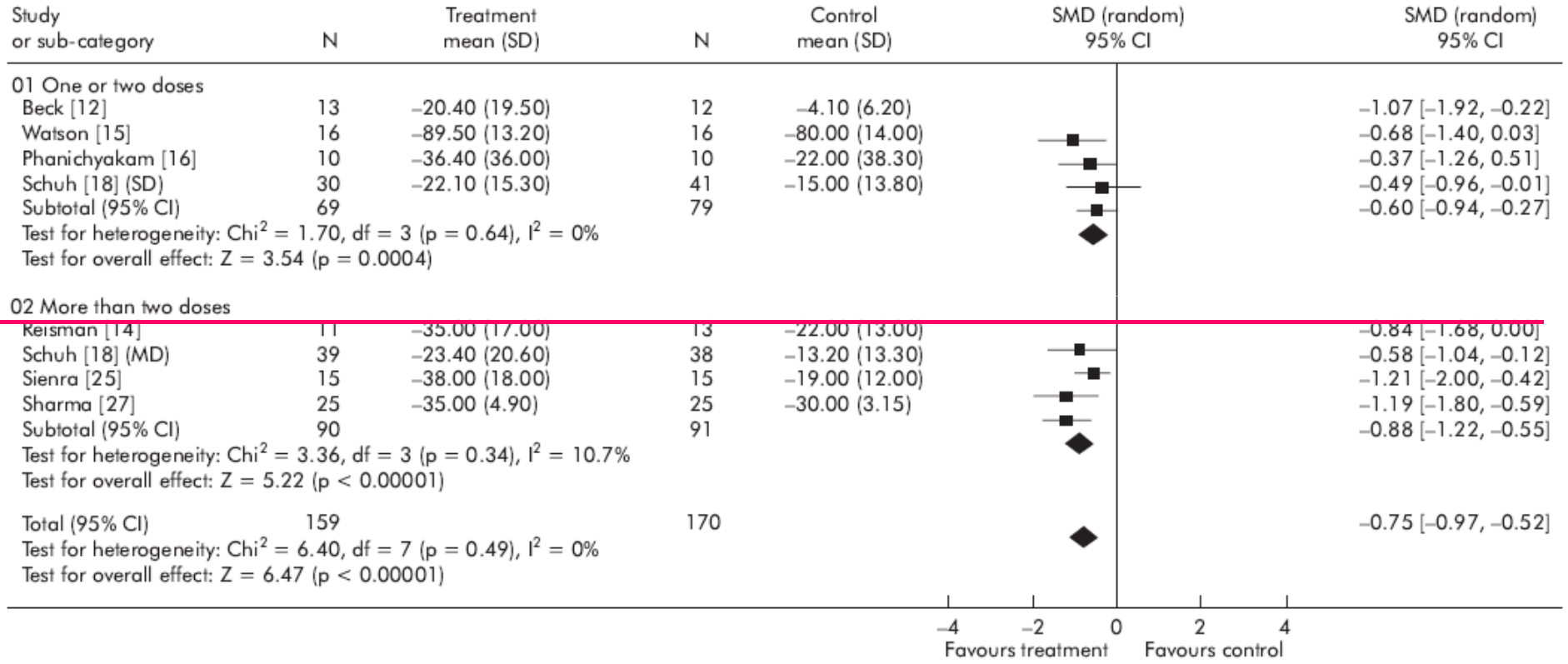
N=16 RCT, n=1786 children & adolescents



Rodrigo GJ & Castro-Rodriguez JA .Thorax 2005

Combination of Anticholinergics to β2-agonits in Children with Acute Asthma

Higher FEV1 improvement



Rodrigo GJ & Castro-Rodriguez JA .Thorax 2005

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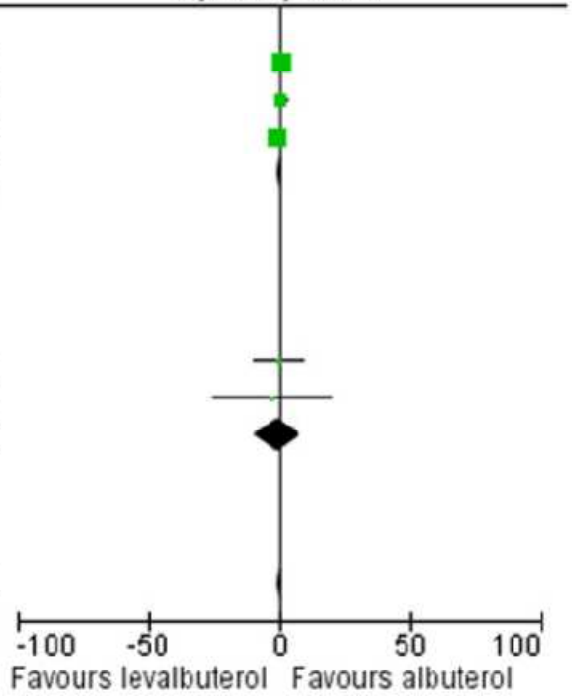
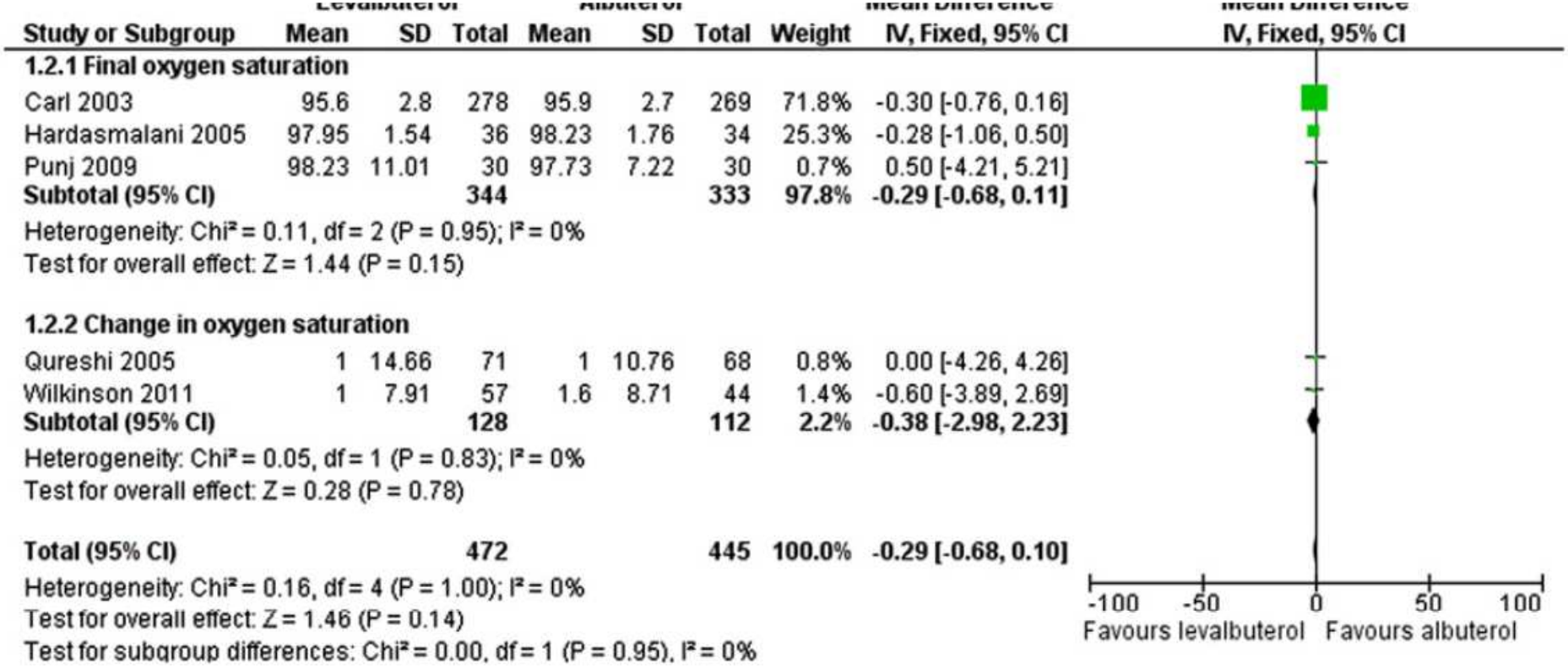
Levalbuterol vs. Albuterol for Acute Ashtma

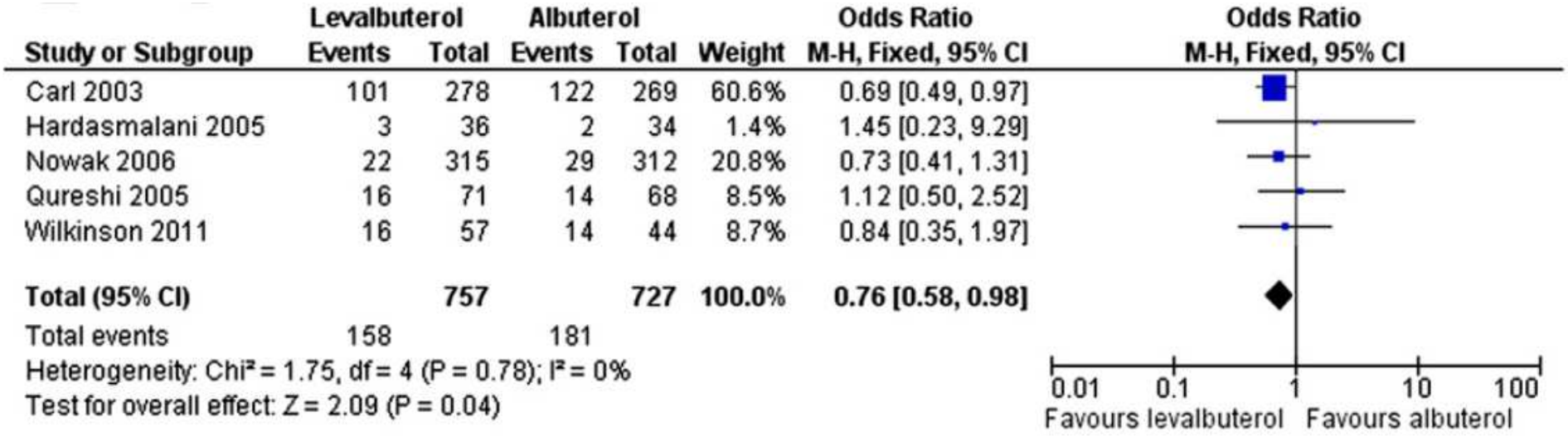
N=7RCTs, n=1625
(only 1 in adults Nowak)

Study or Subgroup	Levalbuterol Mean	SD	Total	Albuterol Mean	SD	Total	Weight	Mean Difference IV, Fixed, 95% CI
1.1.1 Final respiratory rate								
Carl 2003	37	10.4	278	35.6	12.6	269	35.8%	1.40 [-0.54, 3.34]
Hardasmalani 2005	22.63	6.02	36	22	3.84	34	24.3%	0.63 [-1.72, 2.98]
Punj 2009	25.6	3.6	30	26.37	3.82	30	38.2%	-0.77 [-2.65, 1.11]
Subtotal (95% CI)			**344**			**333**	**98.3%**	**0.37 [-0.80, 1.54]**
Heterogeneity: $Chi^2 = 2.55$, df = 2 (P = 0.28); $I^2 = 21\%$								
Test for overall effect: Z = 0.61 (P = 0.54)								
1.1.2 Change in respiratory rate								
Qureshi 2005	-4	29.32	71	-4	28.69	68	1.4%	0.00 [-9.64, 9.64]
Wilkinson 2011	-4.2	56.34	57	-1.5	58.35	44	0.3%	-2.70 [-25.31, 19.91]
Subtotal (95% CI)			**128**			**112**	**1.7%**	**-0.42 [-9.29, 8.46]**
Heterogeneity: $Chi^2 = 0.05$, df = 1 (P = 0.83); $I^2 = 0\%$								
Test for overall effect: Z = 0.09 (P = 0.93)								
Total (95% CI)			**472**			**445**	**100.0%**	**0.35 [-0.81, 1.51]**
Heterogeneity: $Chi^2 = 2.62$, df = 4 (P = 0.62); $I^2 = 0\%$								
Test for overall effect: Z = 0.60 (P = 0.55)								
Test for subgroup differences: $Chi^2 = 0.03$, df = 1 (P = 0.86), $I^2 = 0\%$								



Ram K, Khairwa A. Pulm Pharm & Therap 2013





g. 5. Pooled odds ratio for hospital admission rate of eligible studies comparing levalbuterol versus albuterol in acute asthma.

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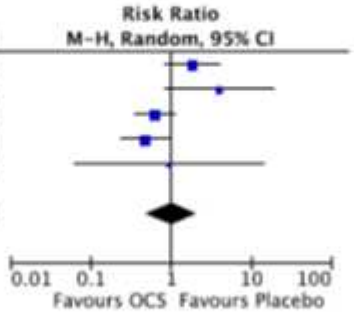
Efficacy of Oral Corticosteroids in the Treatment of Acute Wheezing Episodes in Asthmatic Preschoolers

2a. Overall hospital admissions

Study or Subgroup	SC Events	SC Total	Placebo Events	Placebo Total	Weight	Risk Ratio M-H, Random, 95% CI
Grant 1995	9	19	7	27	25.1%	1.83 [0.83, 4.04]
Oommen 2003	6	52	2	69	13.4%	3.98 [0.84, 18.93]
Scarfone 1993	11	36	19	39	29.2%	0.63 [0.35, 1.13]
Tal 1990	8	39	15	35	26.5%	0.48 [0.23, 0.99]
Webb 1986	1	29	1	27	5.8%	0.93 [0.06, 14.16]
Total (95% CI)		**175**		**197**	**100.0%**	**1.00 [0.49, 2.05]**
Total events	35		44			

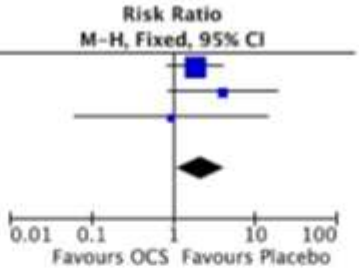
Heterogeneity: $Tau^2 = 0.37$; $Chi^2 = 10.81$, df = 4 (P = 0.03); $I^2 = 63\%$
Test for overall effect: Z = 0.00 (P = 1.00)



2b. Outpatient studies and hospital admissions

Study or Subgroup	SC Events	SC Total	Placebo Events	Placebo Total	Weight	Risk Ratio M-H, Fixed, 95% CI
Grant 1995	9	19	7	27	67.7%	1.83 [0.83, 4.04]
Oommen 2003	6	52	2	69	20.1%	3.98 [0.84, 18.93]
Webb 1986	1	29	1	27	12.1%	0.93 [0.06, 14.16]
Total (95% CI)		**100**		**123**	**100.0%**	**2.15 [1.08, 4.29]**
Total events	16		10			

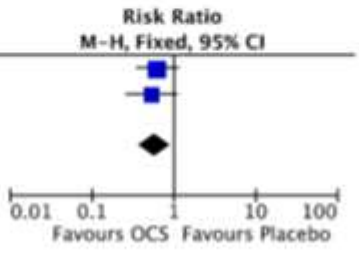
Heterogeneity: $Chi^2 = 1.12$, df = 2 (P = 0.57); $I^2 = 0\%$
Test for overall effect: Z = 2.18 (P = 0.03)



2c. ED studies and hospital admissions

Study or Subgroup	SC Events	SC Total	Placebo Events	Placebo Total	Weight	Risk Ratio M-H, Fixed, 95% CI
Scarfone 1993	11	36	19	39	54.9%	0.63 [0.35, 1.13]
Tal 1990	8	35	15	35	45.1%	0.53 [0.26, 1.09]
Total (95% CI)		**71**		**74**	**100.0%**	**0.58 [0.37, 0.92]**
Total events	19		34			

Heterogeneity: $Chi^2 = 0.12$, df = 1 (P = 0.73); $I^2 = 0\%$
Test for overall effect: Z = 2.31 (P = 0.02)



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Inhaled vs. Systemic Corticosteroids for Acute Asthma in Children

N=8 RCT (2-18yrs), n=797

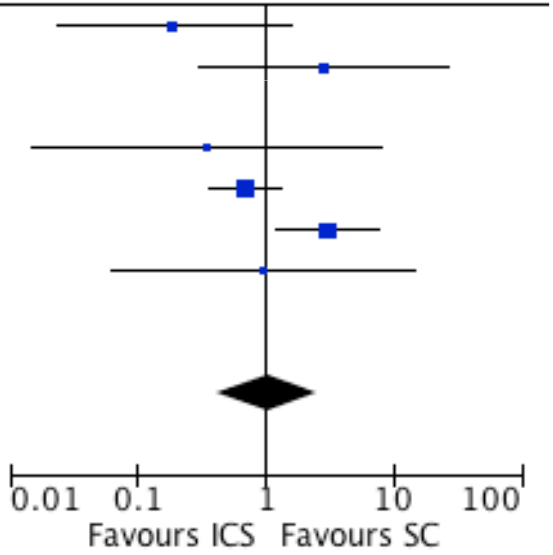
Hospitalizations

Study or Subgroup	ICS Events	ICS Total	SC Events	SC Total	Weight	Risk Ratio M-H, Random, 95% CI
Devidayal 1999	1	41	5	39	12.8%	0.19 [0.02, 1.56]
Manjra 2000	3	165	1	156	11.6%	2.84 [0.30, 26.98]
Milani 2004	0	17	0	17		Not estimable
Nakanishi 2003	0	27	1	28	6.9%	0.35 [0.01, 8.12]
Scarfone 1995	12	56	17	55	32.3%	0.69 [0.37, 1.31]
Schuh 2000	16	51	5	49	27.6%	3.07 [1.22, 7.75]
Schuh 2006	1	35	1	34	8.8%	0.97 [0.06, 14.91]
Volovitz 1998	0	11	0	11		Not estimable
Total (95% CI)		**403**		**389**	**100.0%**	**1.02 [0.41, 2.57]**
Total events	33		30			

RR

Heterogeneity: $Tau^2 = 0.58$; $Chi^2 = 10.59$, df = 5 (P = 0.06); $I^2 = 53\%$

Test for overall effect: Z = 0.05 (P = 0.96)



Beckhaus A, Riutort MC, Castro-Rodriguez JA. Pediatr Pulmonol 2014

Inhaled vs. Systemic Corticosteroids for Acute Asthma in Children

N=8 RCT (2-18yrs), n=797

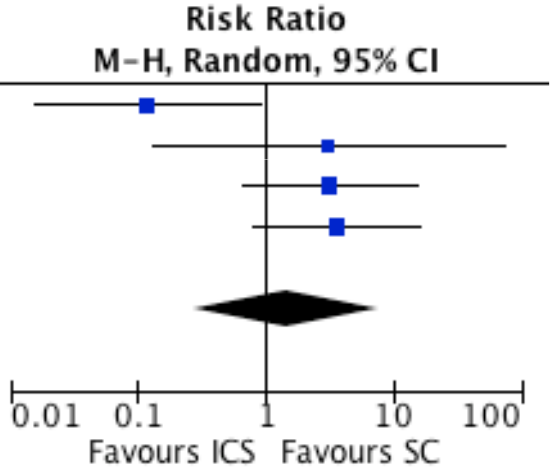
- **Need of additional systemic corticosteroids**

Study or Subgroup	ICS Events	ICS Total	SC Events	SC Total	Weight	Risk Ratio M-H, Random, 95% CI
Devidayal 1999	1	41	8	39	24.8%	0.12 [0.02, 0.91]
Nakanishi 2003	1	27	0	28	16.2%	3.11 [0.13, 73.11]
Schuh 2000	5	35	2	44	29.1%	3.14 [0.65, 15.24]
Schuh 2006	7	33	2	34	29.9%	3.61 [0.81, 16.11]
Total (95% CI)		**136**		**145**	**100.0%**	**1.45 [0.28, 7.62]**
Total events	14		12			

RR

Heterogeneity: Tau² = 1.81; Chi² = 8.77, df = 3 (P = 0.03); I² = 66%

Test for overall effect: Z = 0.44 (P = 0.66)



- NBZ (1 RCT) → **RR: 0.12 (95% CI: 0.02 to 0.91), I^2=0%**
- pMDI (3 RCT) → **RR: 3.35 (95% CI: 1.20 to 9.35), I^2=0%**

Beckhaus A, Riutort MC, Castro-Rodriguez JA. Pediatr Pulmonol 2014

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Heliox- driven β2-AGONISTS Nebulization for children & adults with acute asthma: a sistematic review/meta-analysis

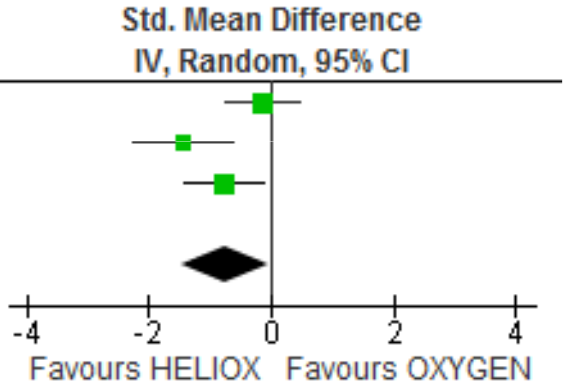
11 RCT (3 RCT children, n=113) mean 120 min He 70:30

Mean change in Asthma or pulmonary composite score

	Experimental			Control				Std. Mean Difference
Study or Subgroup	Mean	SD	Total	Mean	SD	Total	Weight	IV, Random, 95% CI
Bigham [24]	-1.9	1.5	22	-1.7	1.5	20	35.7%	-0.13 [-0.74, 0.48]
Kim [21]	-6.7	2.4	15	-3.3	2.2	15	29.5%	-1.44 [-2.25, -0.62]
Rivera [23]	-4	3	20	-2	2	21	34.8%	-0.77 [-1.41, -0.14]
Total (95% CI)			**57**			**56**	**100.0%**	**-0.74 [-1.45, -0.03]**

Heterogeneity: $Tau^2 = 0.27$; $Chi^2 = 6.54$, df = 2 (P = 0.04); $I^2 = 69\%$

Test for overall effect: Z = 2.04 (P = 0.04)



Rodrigo G & Castro-Rodriguez, Allergy 2013

Heliox- driven β2-AGONISTS Nebulization for children & adults with acute asthma: a sistematic review/meta-analysis

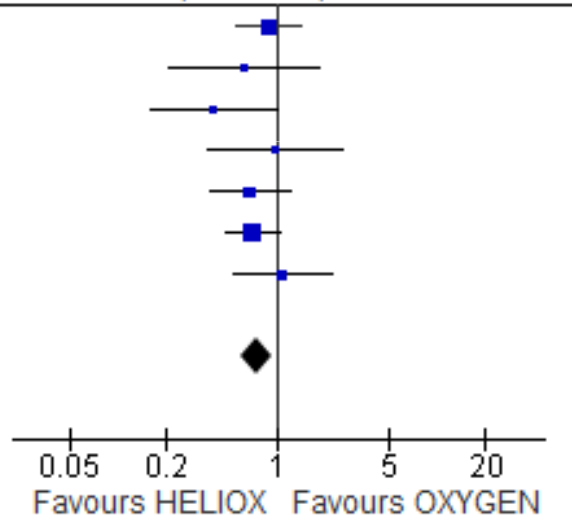
11 RCT (3 RCT children, n=113) mean 120 min He 70:30

Hospitalizations

Study or Subgroup	Favours HELIOX Events	Total	Oxygen Events	Total	Weight	Risk Ratio M-H, Random, 95% CI
Dorfman [18]	12	20	13	19	24.0%	0.88 [0.55, 1.40]
Henderson [17]	5	102	8	102	4.5%	0.63 [0.21, 1.85]
Kim [22]	4	15	10	15	6.4%	0.40 [0.16, 1.00]
Kress [19]	6	23	6	22	5.7%	0.96 [0.36, 2.52]
Lin Lee (a) [23]	12	40	18	40	15.6%	0.67 [0.37, 1.20]
Rivera [24]	12	20	18	21	33.5%	0.70 [0.47, 1.04]
Rose [20]	9	20	8	19	10.4%	1.07 [0.52, 2.19]
Total (95% CI)		**240**		**238**	**100.0%**	**0.75 [0.59, 0.94]**
Total events	60		81			

Heterogeneity: $Tau^2 = 0.00$; $Chi^2 = 3.84$, $df = 6$ ($P = 0.70$); $I^2 = 0\%$

Test for overall effect: $Z = 2.46$ ($P = 0.01$)



Rodrigo G & Castro-Rodriguez, Allergy 2013

Conclusions: Management Acute Asthma

-Salbutamol by MDI is better than by nebulizer

-Valvulate and non-valvulate spacer device are similar

-Salbutamol is equal to Leva-salbutalmol

-Bromuro ipatropio + salbutamol is better than salbutamol (moderate/severe exacerbations)

-Oral Corticosteroids is effectiveness only at the ED (not a home)

-Inhaled Corticosteroids is similar to systemic corticosteroids

-Nebulization salbutamol w/Heliox is better than w/oxygeno (severe exacerbations)

Muito Obrigado
Muchas Gracias
Thanks!

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