DRIVING CHANGE 2023
THE URGENT CARE CONVENTION

Let's Take a Breath and Look at the Evidence: An Update on Common Pediatric Respiratory Conundrums

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Financial Disclosures

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- I have no financial disclosures
- Acknowledgement: Thank you to Dr. Sabah Iqbal – asthma section

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Objectives

- To discuss Albuterol dosing when managing asthma
- To evaluate steroid choice when managing asthma and croup
- To evaluate short course antibiotic therapy in children with community-acquired pneumonia (CAP)

Audience Question: 9-year-old 35 kg boy presents w severe asthma exacerbation. He has a hx of asthma and is on Flovent. Has had 2 puffs Alb MDI with spacer in the car on the way to your UC.

What is the maximum Albuterol you would use in this case:

A. 5mg

B. 10mg

C. 15mg

D. 20mg

Albuterol: How Much?
Asthma, *Peds in Review* -2019

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	Nebulizer	MDI with spacer
Green		2 puffs pre-exercise

- 1 single Albuterol 2.5 mg/3ml vial = 4-6 puffs Albuterol MDI

Patel et al. Peds in Rev. 2019

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Albuterol: How much?
Asthma, *Peds in Review* -2019

	Nebulizer	MDI with spacer
Green		2 puffs pre-exercise
Yellow	2.5 mg q4h	2-4puffs Q4h

Albuterol: How much?
Asthma, *Peds in Review* -2019

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	Nebulizer	MDI with spacer
Green		2 puffs pre-exercise
Yellow	2.5 mg q4h	2-4puffs Q4h
RED		
< 10 kg	5 mg/h	
10-20kg	10 mg/h	
20-30kg	15mg/h	
>30 kg	20 mg/h	

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Albuterol: How much?
Asthma, *Peds in Review* -2019

	Nebulizer	MDI with spacer
Green		2 puffs pre-exercise
Yellow	2.5 mg q4h	2-4puffs Q4h
RED		
< 10 kg	5 mg/h	4 puffs Q 20m X 3
10-20kg	10 mg/h	6 puffs Q 20m X 3
20-30kg	15mg/h	6 puffs Q 20m X 3
>30 kg	20 mg/h	8 puffs Q 20m X 3

Albuterol: How much?
Asthma, *Peds in Review* -2019

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1 single Albuterol 2.5 mg/3ml vial = 4-6 puffs Albuterol MDI

Patel et al. Peds in Rev. 2019

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Albuterol: The Evidence

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- Internet based survey of 43 children's hospitals around the country to establish what providers are actually doing: up to 25mg/hr

- National Asthma Education and Prevention Program (NAEPP) Expert Panel 2:
  - 0.15 mg/kg Alb X 3 [min 2.5mg]
  - Then 0.15-0.3 mg/kg Alb q1 [max 10 mg]
  - 0.5 mg/kg Alb continuous

- Patel SJ, Teach SJ. Asthma. *Peds in Review.* Nov 2019

- Camargo et al. Managing asthma exacerbations in the Emergency Department: Summary of the NAEPP Expert Panel Report 3 guidelines. *J Allergy Clin Immun.* Aug 2009

- Seattle Children's Asthma Pathway: https://www.seattlechildrens.org/globalassets/documents/healthcare-professionals/clinical-standard-work/asthma_pathway.pdf

- CHOP Asthma Pathway: https://www.chop.edu/clinical-pathway/asthma-emergent-care-clinical-pathway

- Arnold et al. The dilemma of Albuterol dosing in acute asthma exacerbations in pediatrics patients. *Chest: 2011.*
  - Up to 25mg/hr

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Audience Question: I prefer Xopenex, especially if a child needs lots of nebs; it's better for the heart rate!

A. Yes

B. No

A Comparison of Heart Rate Changes Associated with Levalbuterol and Racemic Albuterol in Pediatric Cardiology Patients, *Annals of Pharmacotherapy* - 2013

- Single center review of EMRs
- N=192

- <u>Inclusion criteria</u>:
  - Received at least 3 doses of levalbuterol and/or racemic albuterol during the study period
  - Age younger than 18 years
  - Dx of congenital heart disease (CHD), cardiomyopathy, or supraventricular tachycardia

- <u>Exclusion criteria</u>:
  - Received a β-blocker or continuous racemic albuterol
  - Did not have documented pre- and post dose HRs

A Comparison of Heart Rate Changes Associated with Levalbuterol and Racemic Albuterol in Pediatric Cardiology Patients, *Annals of Pharmacotherapy* – 2013

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- Racemic albuterol and levalbuterol induced an equivalent increase in HR in peds cardiology patients when the first 3 doses were evaluated

192 children with cardiac dx and wheezing

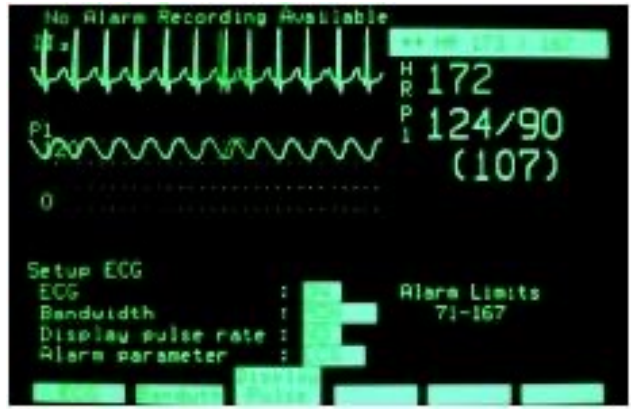
140 Albuterol

6.6 BPM increase

40 Xopenex

6.3 BPM increase

10 Alb + Xopenex



NO DIFFERENCE between Albuterol and Xopenex!

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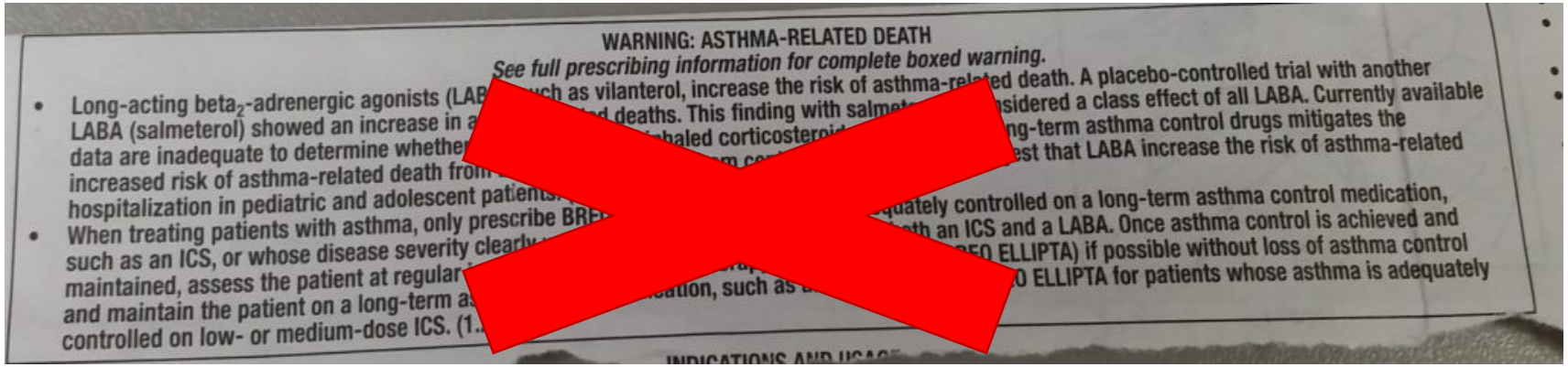
Combined Analysis of Asthma Safety Trials of Long Acting β_2-Agonists, *NEJM* - 2018



- Initial studies looked at LABA alone: increased risk of death
- 2010: FDA mandated prospective RCTs comparing safety of combo therapy
  - LABA plus an inhaled glucocorticoid (combo therapy) with inhaled glucocorticoid alone
- Independent joint oversight committee - final combined analysis of 4 trials
- N=36,010
- **Combo of LABA and ICS: no increase in serious events**
  - **Improvement in symptoms over ICS alone!**
- Black box warning label removed Dec 2017

Anticholinergics

- Ipratropium bromide (Atrovent): prevents admission when using with Albuterol

- < 30 kg: 0.5 mg X 1
- > 30 kg: 1 mg (2 nebs)

- **No longer recommended in mild exacerbations!**

Patel SJ, Teach SJ. Asthma. Peds in Review. Nov 2019

Audience Question:

4-year-old 20 kg girl presents with near silent chest, diffuse retractions, sats of 87%. Her lips are dusky. She is grunting, unable to cooperate, agitated and crying. Mother states that she has had a cough for 2 days and has been “breathing hard” for the last 8 hours.

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What is the first medication you give?

A. Albuterol

B. Atrovent

C. IM/IV steroids

D. Epinephrine

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Epinephrine

- Insufficient evidence to be recommended universally for severe exacerbations
- Severe or life-threatening exacerbations:
  - Older children - silent chest
  - Younger children - air hungry, hypoxic, and aggressive or disoriented
  - Respiratory arrest
- Epi helps open up airways so that albuterol can get into lower airways more effectively
- Epinephrine 1:1000 (1mg/1ml): 0.01 mg/kg/dose to max 0.5mg IM
  - Dosing is standard and matches dosing for anaphylaxis
- Epi-Pens?

Patel SJ, Teach SJ. Asthma. Peds in Review. Nov 2019

Sellers, WF. Epinephrine auto-injectors for acute asthma, as well as anaphylaxis. Brit Journ General Pract. 2019

Audience Question:

It's time for steroids….

6-year-old boy with moderate asthma exacerbation who is responding well to albuterol nebs.

What steroid do you give this child?

A. Dexamethasone

B. Prednisolone

C. Other

Oral Steroids – Dexamethasone v. Prednisone

Steroids given in acute exacerbations decrease admissions

Scarfone et al. Pediatrics: Oct 1993

- **DEXAMETHASONE**
  - Longer half-life
  - Less vomiting
  - 1 or 2 total doses over 1-2 days
    - 1 dose = 5 days Prednisolone
    - Altamimi et al. Peds Em Care, 2006
  - Better adherence = better outcomes

- **PREDNISONE**
  - Short half life: BID dosing
  - Vomiting
  - 5 days
    - Or 3 days?
    - *Chang et al. Med J Aust. 2008*

NO difference in admission rates, # Albuterol received, or bounce backs

Ready for discharge: Inhaled Corticosteroids (ICS) in UC setting?

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- HIGH EVIDENCE with CONDITIONAL RECOMMENDATION:
  - Children 0-4 years at start of RTI: Add short course ICS + PRN SABA
- HIGH (12 and older) and MODERATE (4-11yrs) EVIDENCE with STRONG RECOMMENDATION:
  - **Moderate to severe persistent asthma: High dose ICS with SABA (i.e: Flovent + Albuterol) or same-dose ICS/LABA with SABA (i.e: Qvar + Albuterol)**

2020 Focused Updates to the Asthma Management Guidelines: A Report from the National Asthma Education and Prevention Program Coordinating Committee Expert Panel Working Group

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Audience Question:

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A 2-year-old patient presents to your office with a barking cough and no stridor at rest.

What is the appropriate choice for oral glucocorticoid therapy?

A. Prednisolone

B. Solumedrol

C. Dexamethasone

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Audience Question:

A 2-year-old patient presents to your office with a barking cough and no stridor at rest.

What is the appropriate dosing option for dexamethasone therapy?

A. Dexamethasone 0.6mg/kg

B. Dexamethasone 0.15mg/kg

C. Dexamethasone 0.3mg/kg

Prednisolone Versus Dexamethasone for Croup, *Pediatrics* - RCT 2019

- Peds EDs in Australia
- N=1252
- Primary outcome measures:
  - Westley Croup Score (WCS) measure of croup severity
  - Re-attendance for f/u of ongoing symptoms

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Prednisolone Versus Dexamethasone for Croup, *Pediatrics* - RCT 2019

- 3 treatment groups:
  - Dexamethasone 0.6mg/kg (standard/"control" dose) PO
  - Low-dose dexamethasone 0.15mg/kg PO
  - Prednisolone 1mg/kg PO

- **Showed noninferiority of low-dose dexamethasone and prednisolone relative to the standard full dose of dexamethasone**

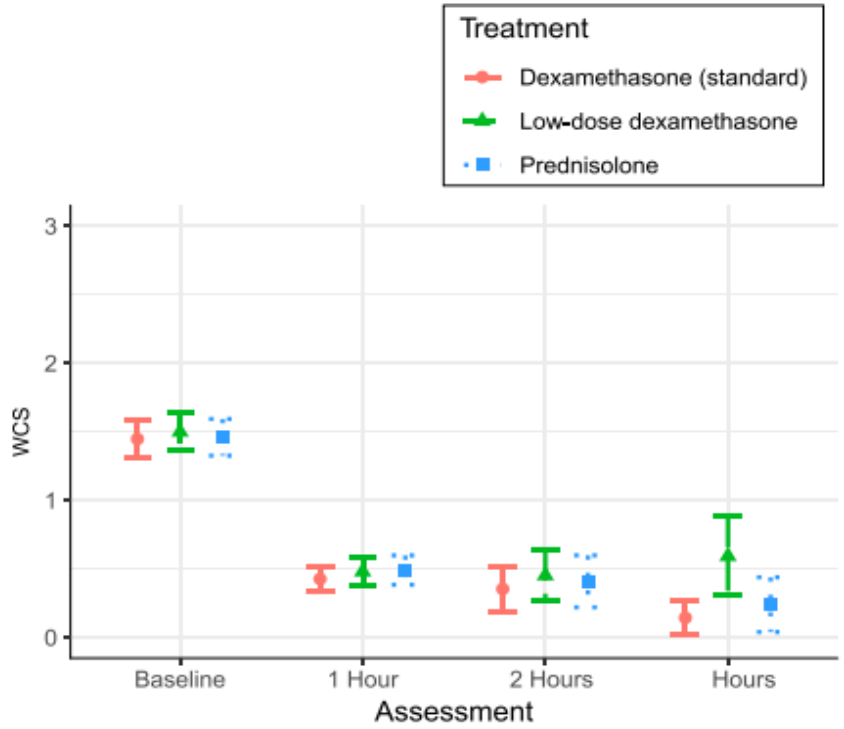

FIGURE 2
Westley Croup Score by time and treatment group. Westley Croup Score, mean and 95% confidence interval by assessment and treatment group; circle and solid line represents dexamethasone, triangle and dashed lined represents low-dose dexamethasone, and square and dotted line represents prednisolone.

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Glucocorticoids for Croup in Children – *Cochrane Review* 2023 (update from 2018)

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- 45 RCTs, systematic review
- N=5888

- Inclusion Criteria:
  - Must have assessed at least 1 of the following -
    - Primary outcomes: Change in croup score or return visits, (re)admissions to the hospital or both
    - Secondary outcomes: Length of stay in hospital or emergency departments, patient improvement, use of additional treatments, or adverse events

- **Results: Smaller dose of 0.15 mg/kg of dexamethasone may be as effective as std dose of 0.60 mg/kg**

- More RCTs are needed to strengthen evidence for effectiveness of low-dose dexamethasone at 0.15 mg/kg to treat croup

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Glucocorticoids for Croup in Children – *Cochrane Review* 2023 (update from 2018)

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- Prednisolone v. Dexamethasone
  - Little to no difference in reduction of croup score at 2 hr post-baseline score
  - Dex probably reduced return visits or (re)admissions for croup by almost 1/2
  - Showed 28% reduction in use of supplemental glucocorticoids as additional treatment

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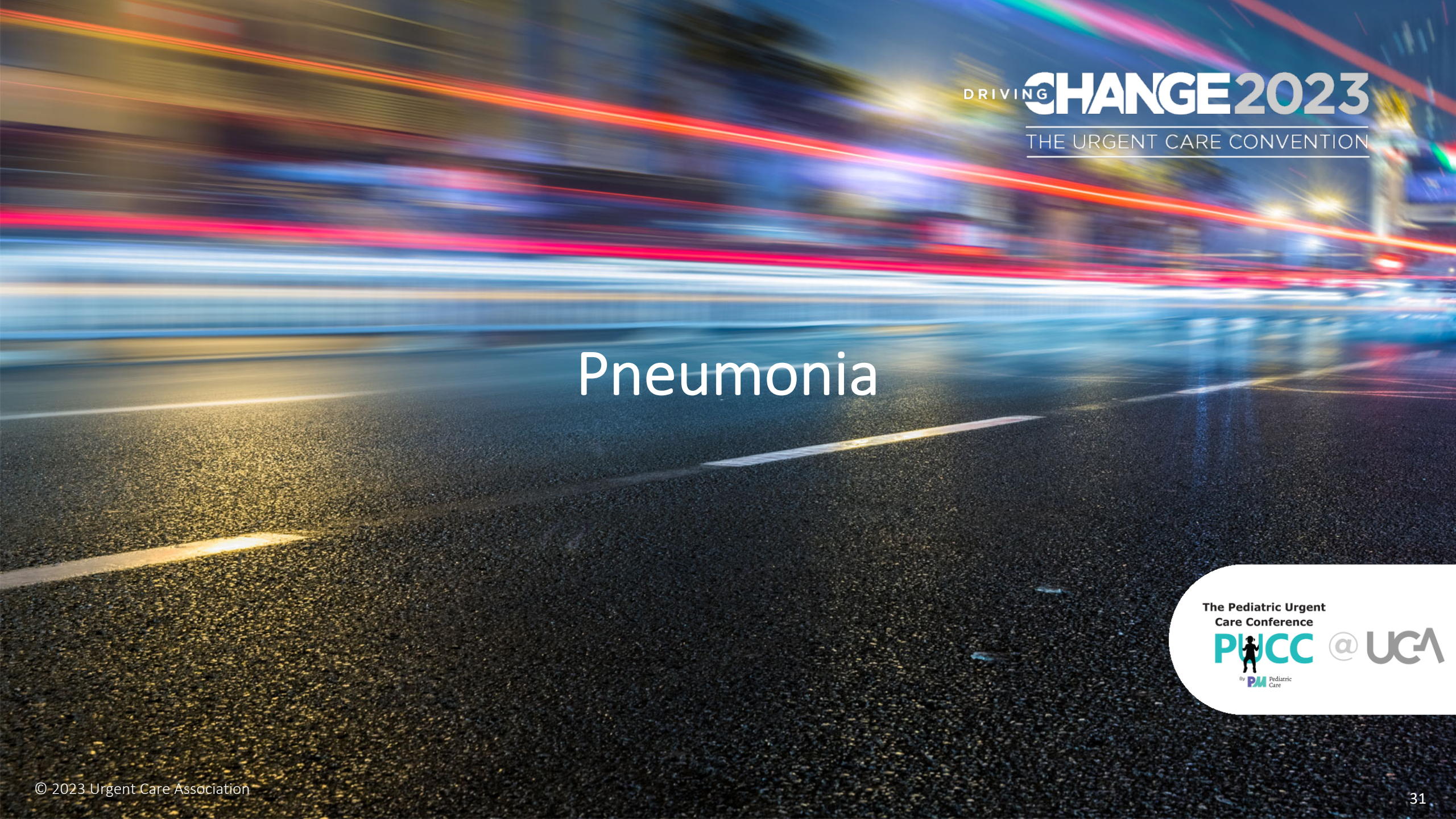
Glucocorticoids for Croup in Children – *Cochrane Review* 2023 (update from 2018)

- Dexamethasone 0.15 mg/kg v. 0.60 mg/kg
  - Little to no difference between doses of dex in:
    - Return visits or (re)admissions of children or both
    - Length of stay in the hospital or ED
    - Need for additional treatments i.e: epi, intubation, supplemental glucocorticoids



Audience Question:

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What is the appropriate duration of antibiotic treatment for pediatric inpatients and outpatients with community acquired pneumonia who are improving?

A. 5 days

B. 8 days

C. 10 days

D. 14 days

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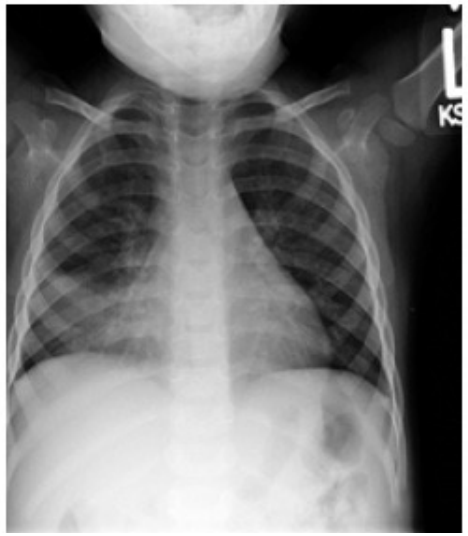
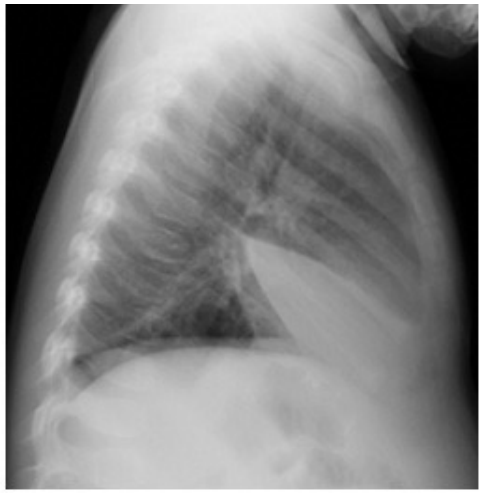
Community Acquired Pneumonia (CAP)

- RCTs for adults with CAP show 5-day course of abx as effective as longer courses
- Few RCTs for peds evaluating short-course abx for CAP
- Current standard: 10-day course of HD Amoxil
- Short Course: 5-day course of HD Amoxil





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SAFER (Short-Course Antimicrobial Therapy for Pediatric Respiratory Infections), *JAMA Pediatrics* - RCT 2021

- Peds EDs in Canada
- Ages 6 mos to 10 yrs
- N=281
- Outpatient: 5-day course of HD Amoxil v. 10-day course of HD Amoxil

SAFER (Short-Course Antimicrobial Therapy for Pediatric Respiratory Infections), *JAMA Pediatrics* - RCT 2021

Table 2. Clinical Cure Outcomes

Outcome	Intention-to-treat analysis			Per protocol analysis (adherent to medications)			Strict per protocol analysis (adherent to medications and consolidation on radiograph)		
	Patient group[a]			Patient group[a]			Patient group[a]		
	Intervention (n = 140)	Control (n = 141)	RD (97.5% 1-sided CL)	Intervention (n = 122)	Control (n = 114)	RD (97.5% 1-sided CL)	Intervention (n = 86)	Control (n = 87)	RD (97.5% 1-sided CL)
Clinical cure (primary)	108 (85.7)	106 (84.1)	0.023 (−0.061 to ∞)	101 (88.6)	99 (90.8)	−0.016 (−0.087 to ∞)	73 (89.0)	74 (89.2)	−0.011 (−0.096 to ∞)
Missing data, No.	14	15	29	8	5	13	4	4	8
Clinical cure not requiring additional intervention (secondary)	116 (93.5)	113 (90.4)	0.028 (−0.038 to ∞)	107 (95.5)	104 (95.4)	−0.006 (−0.055 to ∞)	76 (95.0)	78 (94.0)	−0.004 (−0.071 to ∞)
Missing data, No.	16	16	32	10	5	15	6	4	10

Abbreviations: CL, confidence limit; RD, risk difference.

[a] Unless otherwise indicated, data are expressed as number (percentage) of patients.

- **Short-course treatment was found to be statistically noninferior**

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SCOUT-CAP (Short- vs Standard-Course Outpatient Antibiotic Therapy for CAP in Children), *JAMA Pediatrics* - RCT 2022

- Multicenter study, Tennessee
- Ages 6 mos to 71 mos (6yrs)
- N=380
- Primary endpoint: End-of-treatment response adjusted for duration of antibiotic risk (RADAR)
- Outpatient: 5-day course of HD Amoxil v. 10-day course of HD Amoxil

SCOUT-CAP (Short- vs Standard-Course Outpatient Antibiotic Therapy for CAP in Children), *JAMA Pediatrics* - RCT 2022

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- Inclusion criteria:
  - Otherwise healthy children diagnosed with uncomplicated CAP in an outpatient clinic, UC, ED and treated with Amox, Amox-Clav or Cefdinir
  - Enrolled on days 3 to 6 of initially prescribed therapy

- Exclusion criteria: (remember enrolled on days 3-6 of tx)
  - Fever within 24hrs of presentation
  - Tachypnea
  - Severe cough

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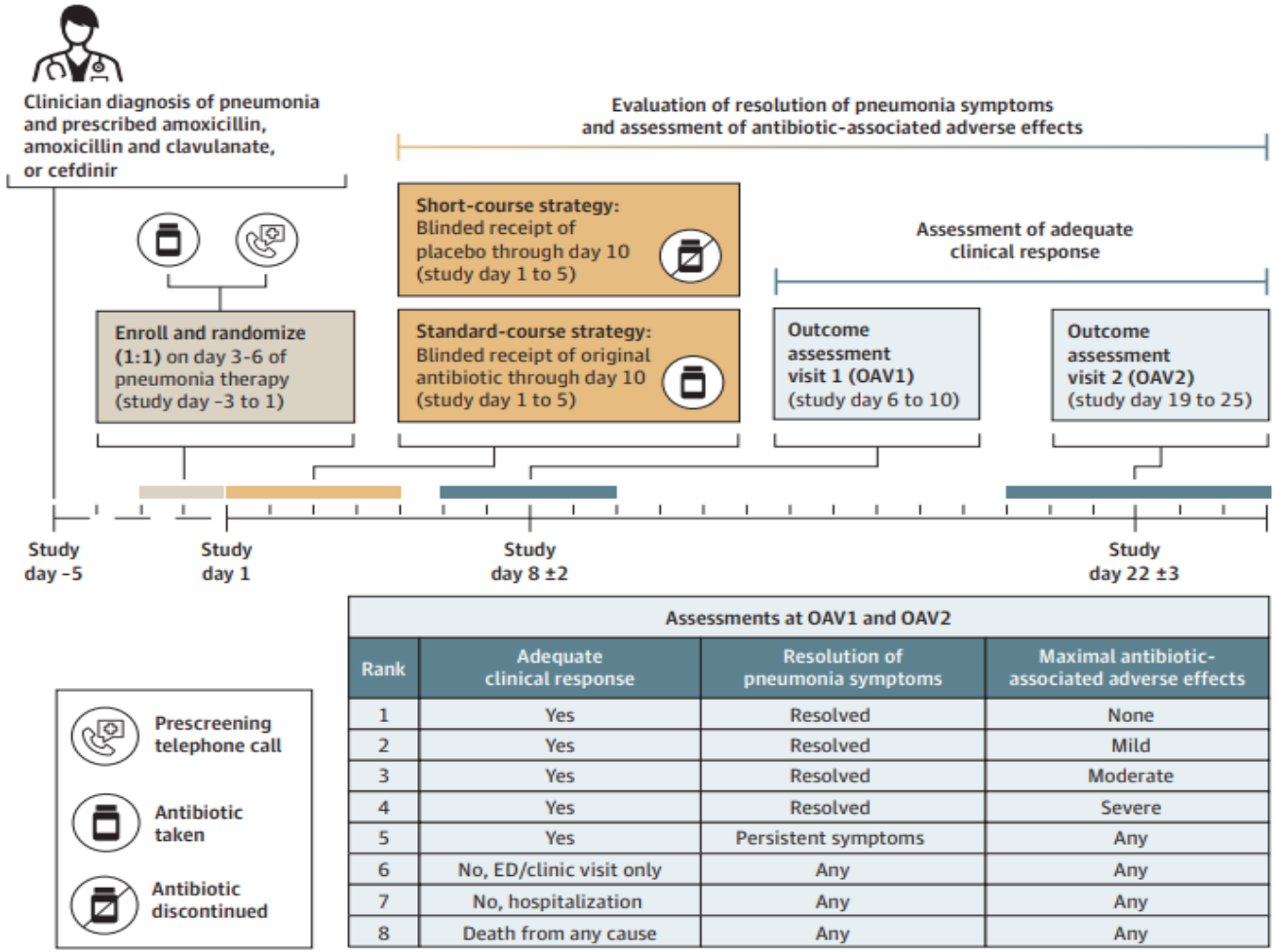
SCOUT-CAP (Short- vs Standard-Course Outpatient Antibiotic Therapy for CAP in Children), *JAMA Pediatrics* - RCT 2022

- DOOR components:
  - **Adequate clinical response**
  - **Resolution of symptoms**
  - **Presence and severity of abx-associated adverse effects**
  - Rank 1 = best possible outcome
  - Rank 8 = worst possible outcome



Assessments at OAV1 and OAV2			
Rank	Adequate clinical response	Resolution of pneumonia symptoms	Maximal antibiotic-associated adverse effects
1	Yes	Resolved	None
2	Yes	Resolved	Mild
3	Yes	Resolved	Moderate
4	Yes	Resolved	Severe
5	Yes	Persistent symptoms	Any
6	No, ED/clinic visit only	Any	Any
7	No, hospitalization	Any	Any
8	Death from any cause	Any	Any

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SCOUT-CAP (Short- vs Standard-Course Outpatient Antibiotic Therapy for CAP in Children), *JAMA Pediatrics* - RCT 2022

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- **5-day abx course superior to a 10-day course**
- Similar:
  - Clinical response
  - Resolution of symptoms
  - Abx-associated adverse effects

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How you can drive change:

- Do not fear albuterol! Most institutions using up to 20mg/hr
- Consider low dose dexamethasone in croup management
- Consider 5-day antibiotic course in CAP

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Session Evaluation

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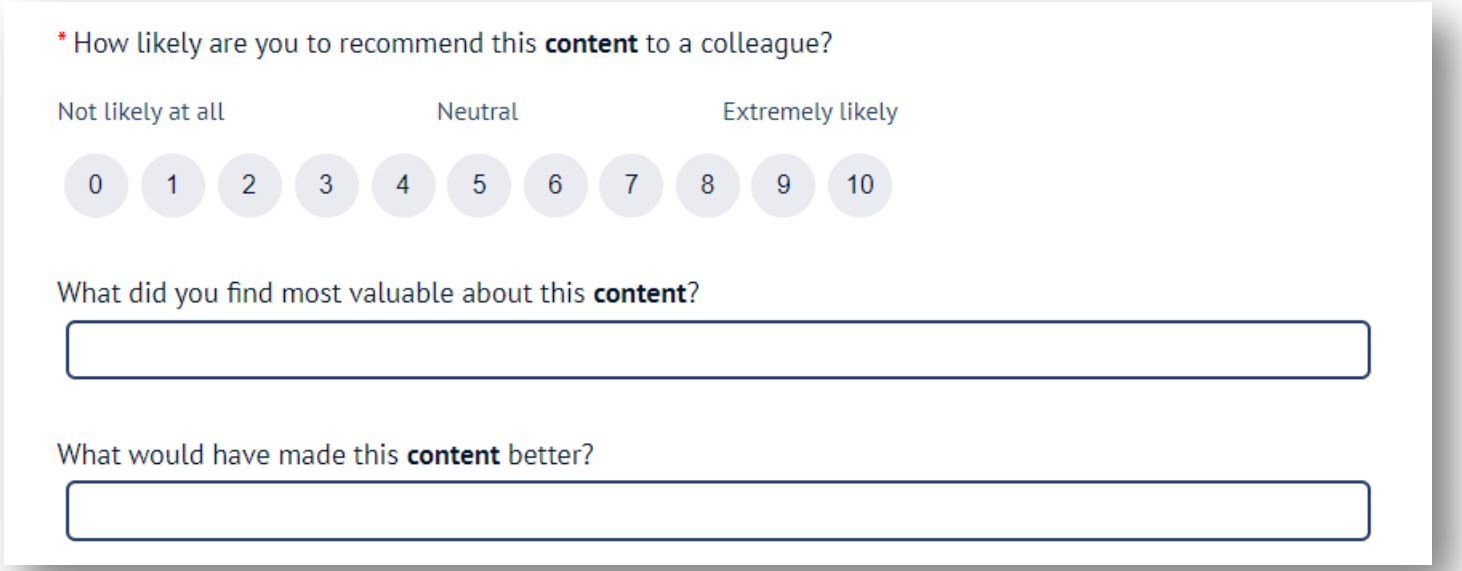
- Your feedback is valuable, take a moment to complete the survey for this session.
- To claim CME, you must complete a separate survey available after the convention.



References

- Aregbesola A et al. Glucocorticoids for croup in children. *Cochrane database of systematic reviews*, 2023, Vol.1 (1), p.CD001955.
- Kelly A et al. A comparison of heart rate changes associated with levalbuterol and racemic albuterol in pediatric cardiology patients. *Ann Pharmacotherapy* 2013 May;47(5):644-50.
- Parker CM, Cooper MN. Prednisolone versus dexamethasone for croup: a randomized controlled trial. *Pediatrics* 2019;144.
- Patel et al. Asthma. *Pediatr Rev.* 2019 Nov; 40(11): 549–567.
- Pernica J et al. Short-Course Antimicrobial Therapy for Pediatric Community-Acquired Pneumonia. The SAFER Randomized Clinical Trial. *JAMA Pediatr*. 2021;175(5):475-482.
- Williams DJ, Creech CB, Walter EB, et al. Short- vs Standard-Course Outpatient Antibiotic Therapy for Community-Acquired Pneumonia in Children: The SCOUT-CAP Randomized Clinical Trial. *JAMA Pediatr*. Published online January 18, 2022.
- Community-acquired Pneumonia in Pediatric Populations | 2012-04-01 |… (reliasmedia.com)