# To Do or Not To Do: The Bronchiolitis Questions

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# Goals

- Understand the evidence base for the current AAP treatment recommendations for viral bronchiolitis
- Become more familiar with current inpatient strategies for managing moderate to severe bronchiolitis
- Learn about developing preventive and treatment  options

# Objectives

- Review the most pertinent evidence for specific AAP recommendations
- Discuss current inpatient interventions for mitigating moderate to severe disease
- Outline evolving prevention and treatment options

# Viral Bronchiolitis

- Definition
  - "A constellation of clinical symptoms and signs including an upper respiratory prodrome followed by increased respiratory effort and wheezing in children less than 2 years of age." (AAP Guideline 2006)
- 21 million otpt visits/yr
- 57,500 hospitalizations/yr

# Indications for Admission

- Inability to maintain hydration orally
- Sp02 consistently < 90%
- Concerning RR and/or work of breathing
- Concern for apnea

# Apnea in Infants

- 16 sites
- 2207 pts over 3 yrs
- Apnea identified retrospectively in 5%

**TABLE 3** Multivariable Model of Factors Associated With Inpatient Apnea Among Children Admitted to the Hospital With Bronchiolitis

| Characteristics | OR | 95% CI | *P* |
|---|---|---|---|
| Age, corrected for gestational age <37 wk | | | |
| <2.0 wk | 9.67 | 4.11–22.75 | <.001 |
| 2.0–7.9 wk | 4.72 | 2.30–9.68 | <.001 |
| 2.0–5.9 mo | 1.47 | 0.68–3.19 | .33 |
| ≥6.0 mo | 1.00 | Reference | |
| Gender | | | |
| Male | 1.00 | Reference | |
| Female | 1.12 | 0.78–1.61 | .53 |
| Race | | | |
| White | 1.00 | Reference | |
| Nonwhite or missing | 1.28 | 0.70–2.36 | .42 |
| Birth wt | | | |
| <2.3 kg (5 lb) | 2.15 | 1.18–3.92 | .01 |
| 2.3–3.1 kg (5–6.9 lb) | 1.54 | 0.94–2.53 | .09 |
| ≥3.2 kg (7 lb) | 1.00 | Reference | |
| Reported apnea | 3.63 | 2.55–5.16 | <.001 |
| Respiratory rate at preadmission visit | | | |
| <30 | 4.05 | 2.00–8.20 | <.001 |
| 30–39 | 2.35 | 1.52–3.64 | <.001 |
| 40–49 | 1.00 | Reference | |
| 50–59 | 1.29 | 0.66–2.51 | .46 |
| 60–69 | 1.06 | 0.62–1.81 | .84 |
| ≥70 | 2.26 | 1.03–4.95 | .04 |
| Lowest documented oxygen saturation over entire preadmission visit <90% | 1.60 | 1.03–2.46 | .04 |

Apnea in Children Hospitalized With Bronchiolitis

PEDIATRICS
OFFICIAL JOURNAL OF THE AMERICAN ACADEMY OF PEDIATRICS

Alan R. Schroeder, Jonathan M. Mansbach, Michelle Stevenson, Charles G. Macias, Erin Stucky Fisher, Besh Barcega, Ashley F. Sullivan, Janice A. Espinola, Pedro A. Piedra, Carlos A. Camargo Jr

# Treatment Possibilities

# Universal Treatment

- Provide supp oxygen to keep Sp02 >90%
- Maintain hydration
- Suction NP prn (feeds, sleep)
- Minimize stimulation

# To Do or Not To Do

| | Do | Do Not |
|---|---|---|
| Otpt | | |
| ED | | |
| Inpt | | |

# Treatment: SABA

- **No difference**
  - **Hospital admission**
  - **Length of stay**
  - **Oxygen saturation**
  - **Duration of illness**

Not for routine use!

| | Do | Do Not |
|---|---|---|
| Otpt | | • SABA |
| ED | | • SABA |
| Inpt | | • SABA |


- Gadomski A, Scribani MB. Bronchodilators for bronchiolitis. *Cochrane Database Syst Rev.* 2014;6:CD001266
- American Academy of Pediatrics Subcommittee on Diagnosis and Management of Bronchiolitis. Diagnosis and management of bronchiolitis. *Pediatrics.* 2006;118(4):1774–1793

# Treatment: Epinephrine

- **No difference**
  - **Hospital readmissions**
  - **Length of stay**
  - **Vital signs**
  - **Inpatient clinical course**

Not for routine use!

| | Do | Do Not |
|---|---|---|
| Otpt | | • SABA |
| ED | | • SABA<br>• rEpi |
| Inpt | | • SABA<br>• rEpi |


- Hartling L, Bialy LM, Vandermeer B, et al. Epinephrine for bronchiolitis. *Cochrane Database Syst Rev*. 2011;6:CD003123

# Treatment: Corticosteroids

- **No difference**
  - **Hospital admissions at D1 and D7**
  - **Length of stay**
  - **Clinical Score**

Not for routine use!

| | Do | Do Not |
|---|---|---|
| Otpt | | • SABA<br>• Steroids |
| ED | | • SABA<br>• rEpi<br>• Steroids |
| Inpt | | • SABA<br>• rEpi<br>• Steroids |


- Fernandes R, Bialy LM, Vandermeer B, et al. Glucocorticoids for acute viral bronchiolitis in infants and young children. *Cochrane Database Syst Rev.* 2013;6:CD004878
- American Academy of Pediatrics Subcommittee on Diagnosis and Management of Bronchiolitis. Diagnosis and management of bronchiolitis. *Pediatrics.* 2006;118(4):1774–1793

# Treatment: R Epi + Dex

- **RCT, n=800**
- **4 groups**
- **No differences**

Insufficient evidence

| | Do | Do Not |
|---|---|---|
| Otpt | | • SABA<br>• Steroids |
| ED | | • SABA<br>• rEpi<br>• Steroids<br>• rEpi + Dex |
| Inpt | | • SABA<br>• rEpi<br>• Steroids |

Plint A, Johnson DW, Patel H, et al. Epinephrine and dexamethasone in children with bronchiolitis. *N Engl J Med.* 2009;360(20):2079–2089

# Treatment: Hypertonic Saline

- **HS group**
  - **lower hosp'n rate by 14%**
  - **shorter LOS by 0.41 d**
  - **Lower clinical score**
- **No serious adverse events**

Consider using

| | Do | Do Not |
|---|---|---|
| Otpt | | • SABA<br>• Steroids |
| ED | • HS | • SABA<br>• rEpi<br>• Steroids<br>• rEpi + Dex |
| Inpt | • HS | • SABA<br>• rEpi<br>• Steroids |

Zhang L, Mendoza-Sassi RA, Wainwright C, et al. Nebulised hypertonic saline for acute bronchiolitis in infants. *Cochrane Database Syst Rev.* 2017 Dec 21;12:CD006458.

# Treatment: Chest PT

- **No difference**
  - **clinical scores**
  - **time to recovery**
- **Increased risk of transient resp destabilization and vomiting**

Not for routine use!

| | Do | Do Not |
|---|---|---|
| Otpt | | • SABA<br>• Steroids<br>• Chest PT |
| ED | • HS | • SABA<br>• rEpi<br>• Steroids<br>• rEpi + Dex<br>• Chest PT |
| Inpt | • HS | • SABA<br>• rEpi<br>• Steroids<br>• Chest PT |

Figuls R, Gine-Garriga M, Granados Rugeles C, et al. Chest physiotherapy for acute bronchiolitis in paediatric patients between 0 and 24 months old. *Cochrane Database Syst Rev*. 2016 Feb 1;2:CD004873.

# Treatment: Antibacterials

- **Low rates concurrent SBI**
  - **AOM in up to 50%**
  - **UTI in up to 12%**
- **CXR may be misinterpreted**
- **RCTS: No benefit when used indiscriminately**

Not for routine use!

| | Do | Do Not |
|---|---|---|
| Otpt | | • SABA<br>• Steroids<br>• Chest PT<br>• Abx |
| ED | • HS | • SABA<br>• rEpi<br>• Steroids<br>• rEpi + Dex<br>• Chest PT<br>• Abx |
| Inpt | • HS | • SABA<br>• rEpi<br>• Steroids<br>• Chest PT<br>• Abx |

American Academy of Pediatrics Subcommittee on Diagnosis and Management of Bronchiolitis. Diagnosis and management of bronchiolitis. Pediatrics. 2006;118(4):1774–1793

# Treatment: Home Oxygen Therapy

- **Evidence**
  - **1 retro cohort**
  - **1 RCT (Denver)**
- **Well-tolerated**
- **Supported by PCPs and parents**
- **<10% admission rate**

Consider using

| | Do | Do Not |
|---|---|---|
| Otpt | • Home O2 | • SABA<br>• Steroids<br>• Chest PT<br>• Abx |
| ED | • HS<br>• Home O2 | • SABA<br>• rEpi<br>• Steroids<br>• rEpi + Dex<br>• Chest PT<br>• Abx |
| Inpt | • HS<br>• Home O2 | • SABA<br>• rEpi<br>• Steroids<br>• Chest PT<br>• Abx |


- Bajaj L, Turner CG, Bothner J. A randomized trial of home oxygen therapy from the emergency department for acute bronchiolitis. *Pediatrics.* 2006;117(3):633–640
- Flett KB, Breslin K, Bruan PA, et al. Outpatient course and complications associated with home oxygen therapy for mild bronchiolitis. *Pediatrics.* 2014;133(5):769–775

# High-Flow Nasal Cannula

- Safe, well-tolerated
- Proposed mechanisms
  - Washout NP dead space
  - Increased lung compliance
  - Degree of airway pressure
  - Improved mucociliar clearance

# High-Flow Nasal Cannula

- HFNC vs standard supp oxygen
- HFNC had lower rates of tx failure
- No difference
  - Length of stay
  - Duration of oxygen therapy

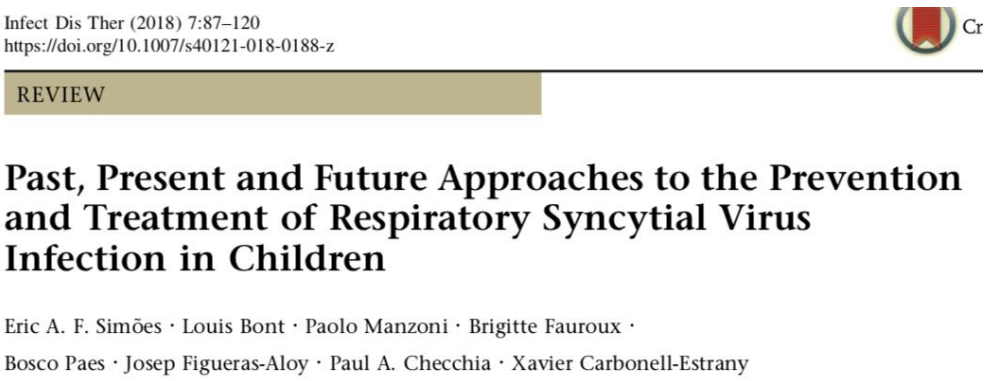

- Franklin D, Babi FE, Schlapbach LJ, et al. A Randomized Trial of High-Flow Oxygen Therapy in Infants with Bronchiolitis. *N Engl J Med*. 2018 Mar 22;378(12):1121-1131.
- Kepreotes E, Whitehead B, Attia J, et al. High-flow warm humidified oxygen versus standard low-flow nasal cannula oxygen for moderate bronchiolitis (HFWHO RCT): an open, phase 4, randomised controlled trial. *Lancet*. 2017 Mar 4;389(10072):930-939.

# Prevention

- Care burden
- Severe RSV LRTI assd w/recurrent wheezing, possibly allergic sensitization

# Prevention

- Synagis administration
- Hand hygiene use
- Tobacco smoke exposure counseling
- Breastfeeding advocacy
- Patient/family education



Infect Dis Ther (2018) 7:87–120
https://doi.org/10.1007/s40121-018-0188-z

REVIEW

**Past, Present and Future Approaches to the Prevention and Treatment of Respiratory Syncytial Virus Infection in Children**

Eric A. F. Simões · Louis Bont · Paolo Manzoni · Brigitte Fauroux · Bosco Paes · Josep Figueras-Aloy · Paul A. Checchia · Xavier Carbonell-Estrany

# Synagis

- <29 wGA
- CLDz
  - <32 wGA with O2 req for >28 days p birth
  - second yr of life req med tx in past 6 mo
- CHDz

# RSV Vaccine…(yes, please!)

- Currently 28 vaccines in preclinical development, 17 in clinical development
- WHO anticipates vaccine availability in 5-10 years
- Novavax in Phase 3 trials for nanoparticle vaccine via maternal immunization. Fast Track designation by FDA
- GlaxoSmithKline in Phase 2 trials of pediatric adenovirus based vaccine

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# Improved Immunoglobulin

- MED18897 (MedImmune) in Phase 2 trials with FDA Fast Track desig'n for Ab with >potency + >half-life = once/season dosing
- RI-001 (Adma Biologics) in Phase 2 trials for immunocompromised patients with RSV URI

# Counseling Advice

- “My pediatrician didn’t tell us things could get worse!”
- “They gave us albuterol, but it didn’t help.”

# References