Current bronchodilator and corticosteroid use in the management of bronchiolitis in Canadian Pediatric Emergency Departments

Amy C Plint, Renee Grenon, Terry P Klassen, and David W Johnson
Disclosure

• No conflict of interest to disclose
• Study supported by funds from the CIHR Team Grant in Pediatric Emergency Medicine
Bronchiolitis: The extent of the problem

- Leading cause of hospitalization of children < 1 year of age
- Hospitalization rates doubled from the 1980s to 1990s
- Canadian hospitalization rates: 35/1000 children < 1 year of age
Bronchiolitis:
The extent of the problem

- US hospital costs estimated at $534 million
- Significant outpatient burden
  - 2 million ED visits/year in the US
  - 8.75 million outpatient office visits/year in US
AAP Bronchiolitis Guideline

• 2007 American Academy of Pediatrics Bronchiolitis Practice Guideline:
  - Advised against routine use of bronchodilators
  - Supported a limited trial of their use in an observed setting
  - Advised again use of corticosteroids
New Evidence

- Two large bronchiolitis trials have been published since guideline was developed
- *PECARN study*: No benefit of single dose dexamethasone in reducing admissions to hospital
- *PERC study (CanBEST)*: Combined treatment with epinephrine and dexamethasone may reduce hospital admissions and shorten symptom duration
Objectives

• To review the current management of bronchiolitis in Canadian pediatric emergency departments (EDs)
• To better understand physician rationale for their management choices
Study Design

- Cross-sectional survey study
- Emergency physicians working in pediatric EDs across Canada
- Current management of bronchiolitis
  - Use of bronchodilators and corticosteroids
  - Rationale for their use
- Approved by Research Ethics Board of the Children’s Hospital of Eastern Ontario
Study Setting and Population

- All physicians in Pediatric Emergency Research Canada (PERC) database
- PERC is a collaborative nation-wide emergency research group
- 15 Canadian Pediatric EDs
- Database represents ≈ 70% of physicians working in Pediatric EDs
Survey Instrument

• Developed *de novo*
• Pilot tested for readability, ease of use, and face validity
• Created in English and translated to French
Survey Instrument

• Bronchiolitis defined
  - 1st episode of wheezing in an infant < 12 months old who has signs of an URTI and presents during typical “RSV” season

• Composed of 18 questions
  - 5 demographic questions
  - 13 questions regarding bronchodilator and corticosteroid use
  - Single-select and multiple choice response; additional opportunity for free text responses
Sampling Procedure

- A pre-survey announcement via e-mail
- Electronic survey to all physicians in PERC database
- Non-responders received up to 3 electronic surveys
- After 3 electronic surveys, non-respondents received a direct mailing of the survey
- Responses confidential
Sample Size and Analysis

• Sample size limited by number of individuals in the PERC database
• Data entry and analysis was performed using the SPSS-PC Version 19
• Explored whether site, type of training, primary clinical practice, academic appointment, and year of medical school graduation were related to the use of bronchodilators and steroids
Outcomes

- Use of bronchodilators, oral corticosteroids, and combination therapy with epinephrine and corticosteroids
- Rationale for respondents’ management choices
- Doses of corticosteroids used
- Comfort with corticosteroid doses
RESULTS
Sample Specification

- 271 physicians surveyed
- 15 sites
- 191 (70.1%) responses
- Response rate by site: 50-100%
## Respondent Characteristics

<table>
<thead>
<tr>
<th>Characteristic (n=190)</th>
<th>n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Years since graduating from medical school</strong></td>
<td></td>
</tr>
<tr>
<td>&lt; 10 years</td>
<td>36 (19.3)</td>
</tr>
<tr>
<td>10 - 20 years</td>
<td>93 (49.7)</td>
</tr>
<tr>
<td>&gt; 20 years</td>
<td>58 (31.0)</td>
</tr>
<tr>
<td><strong>Training</strong></td>
<td></td>
</tr>
<tr>
<td>Pediatric Emergency Medicine Fellowship</td>
<td>88 (46.3)</td>
</tr>
<tr>
<td>Pediatrics</td>
<td>61 (32.1)</td>
</tr>
<tr>
<td>Emergency Medicine</td>
<td>31 (16.3)</td>
</tr>
<tr>
<td>Others</td>
<td>10 (5.2)</td>
</tr>
<tr>
<td><strong>Primary clinical practice</strong></td>
<td></td>
</tr>
<tr>
<td>Pediatric Emergency Medicine</td>
<td>139 (72.6)</td>
</tr>
<tr>
<td>Emergency Medicine</td>
<td>24 (12.6)</td>
</tr>
<tr>
<td>Equal Pediatric Emergency/Emergency Medicine</td>
<td>5 (2.6)</td>
</tr>
<tr>
<td>Other</td>
<td>23 (12.1)</td>
</tr>
<tr>
<td><strong>Academic Appointment</strong></td>
<td>146 (76.4)</td>
</tr>
</tbody>
</table>
Use of bronchodilators

• “In the ED, do you typically treat infants who present with bronchiolitis with a trial of bronchodilators?”

• Yes: 127/191 (66%)
  - Salbutamol: 62/127 (49.2%)
  - Epinephrine 61/127 (48.4%)
Reasons for preferring salbutamol

62/127 (49.2%) preferred salbutamol over epinephrine
Reasons for preferring epinephrine

61/127 (48.4%) preferred epinephrine over salbutamol.
Use of Steroids

“In the ED, do you use steroids in treating patients with bronchiolitis?”
What influences the decision to “sometimes” use steroids?

120/191 (62.8%) sometimes use steroids
What influences the decision to “never” use steroids?

66/191 (34.6%) never use steroids

- Side effects: 24.2%
- Uncomfortable with dose: 30.3%
- Do not work: 12.1%
- More evidence needed: 15.5%
Factors associated with use of bronchodilators or steroids

- Associated only with site of practice
- Not associated with
  - Type of training
  - Type of primary clinical practice
  - Academic appointment
  - Length of time since medical school graduation
Combined Epinephrine/Steroid Therapy

• Do you combine steroid treatment with epinephrine?
  - Yes: 87/124 (70.2%)
  - No: 37/124 (29.8%)

• Reasons for “no”:
  - Do not believe benefit to combination: 26.5%
  - Do not use epinephrine: 35.3%
  - Other: 38.2% (dose concerns)
Combined Epinephrine/Steroid Therapy

- Do you use 2 doses of epinephrine 30 minutes apart and 1.0 mg/kg dexamethasone immediately before or after the epinephrine?
  - Yes: 51/87 (58.6%) (“CanBEST” dose)
  - No: 36/87 (42.4%)

- No to “CanBEST” ED dose:
  - Dexamethasone: 0.2 mg/kg to 0.6 mg/kg dose
  - Prednisone: 1-2 mg/kg
  - Some do not consider timing of meds
Steroid courses used

• When treating with oral steroids, do you typically use the “CanBEST” dose and steroid regimen (1.0 mg/kg of dex in the ED, followed by 0.6 mg/kg daily for 5 days)?
  - Yes: 41.7%
  - No: 58.3%

• Among the “No”:
  - Diverse range of practices
  - Lower doses/shorter courses of dexamethasone
  - Use of prednisone
75% of respondents preferred a single dose of dexamethasone in the ED
Limitations

- Inherent recall bias
- Sampled only pediatric ED physicians
- Qualitative component may have added richer data
- Comparative effectiveness review of interventions in bronchiolitis has been published since survey completed
Conclusion

- Bronchodilator use is widespread in the management of bronchiolitis
- Steroid use is less common and most strongly influenced by illness severity
- Discomfort exists among clinicians in using steroids, particularly longer courses, and a stated preference for a single ED dose