Background

- Bronchodilators do not improve outcomes or affect length of hospital stay for patients with bronchiolitis.
- Inpatient bronchodilator usage varies widely between hospitals.
- Respiratory scores have been shown to decrease bronchodilator utilization.
- A 3-4 element respiratory score can be used to assess response to an intervention such as a bronchodilator trial.
- Use of scores to decrease utilization has not been evaluated outside of large, freestanding children’s hospitals.

Specific Aims

- Achieve 90% implementation of a respiratory score for patients admitted with bronchiolitis.
- Decrease bronchodilator usage by 50%.

Methods

**Setting**

- The Value in Inpatient Pediatrics (VIP) Network Quality Collaborative for Improving Hospitalist Compliance with the AAP Bronchiolitis Guideline (B-QIP) was created in 2012 to improve bronchiolitis care through quality improvement (QI) education and tools specific to bronchiolitis.

**Planning the Study of the Intervention**

- 12 community hospitals and 10 university hospitals participated.
- For each cycle, a standard sample size of 20 charts was reviewed by each site team to compute monthly utilization rates and data were uploaded centralized online data repository.
- Data were fed back to sites using simple run charts in real time comparing site performance to group mean performance.

**Method of Evaluation and Analysis**

- Pre-intervention data were collected for Jan-Mar 2013 (cycles 1–3).
- Post-intervention data were collected for Jan-Mar 2014 (cycles 4–6).
- Comparison of pre- and post-intervention data was by chi-square for categorical variables and two-tailed t-test for doses per patient.
- Individual cycle results were compared to the overall group mean by Analysis of Means (ANOM).
- Achievable benchmarks of care (ABCs) were calculated for each measure.

**Planning the Study of the Intervention**

- An multispecialty expert committee was formed comprised of emergency medicine, intensive care, hospital medicine, and community pediatric physicians.
- The expert committee met prior to the start of the project to set criteria for site recruitment, propose areas of improvement, and design metrics.
- Sites would be selected with preference for community setting, more than 50 bronchiolitis admissions per year, and some QI experience.
- Improvement target: bronchodilator usage.

Figure 1: Key Drivers and Interventions

<table>
<thead>
<tr>
<th>Key Drivers</th>
<th>Interventions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reliable evaluation of bronchodilator response</td>
<td>Use of a respiratory score</td>
</tr>
<tr>
<td>Awareness of bronchiolitis evidence</td>
<td>Evidence-based best practices toolkit</td>
</tr>
<tr>
<td>Availability of QI expertise</td>
<td>Monthly webinars for site leaders</td>
</tr>
<tr>
<td>QI coach assigned to each site</td>
<td>QI coach assigned to each site</td>
</tr>
</tbody>
</table>

**Results**

**Table 1: Unadjusted Pre-Post Analysis** showing improvement in the three outcome measures.

<table>
<thead>
<tr>
<th>Measure</th>
<th>Before (n=1028)</th>
<th>After (n=884)</th>
<th>p-value</th>
<th>ABC benchmark (top 10%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patients assessed by score</td>
<td>22%</td>
<td>63%</td>
<td>&lt;0.001</td>
<td>97%</td>
</tr>
<tr>
<td>Bronchodilator use after admission</td>
<td>47%</td>
<td>31%</td>
<td>&lt;0.001</td>
<td>10%</td>
</tr>
<tr>
<td>Bronchodilator doses per patient</td>
<td>3.9</td>
<td>1.7</td>
<td>&lt;0.001</td>
<td>1</td>
</tr>
</tbody>
</table>

Figure 2: Percent of bronchiolitis patients assessed by respiratory score by cycle demonstrating change after the intervention period.

- Pre-Intervention: 23% of patients were assessed by score.
- Post-Intervention: 67% of patients were assessed by score.

**Figure 3: Percent of patients with bronchodilator use after admission by cycle demonstrating change after the intervention period.

Figure 4: Pre/post change in bronchodilator usage arranged by site.

**Limitations**

- Our study included only a small number of data points limiting our analysis of secular trends.
- We were unable to control for clustering at the institutional level through use of the analysis of means.
- We were unable to prospectively measure the effect of specific interventions implemented at each site.

**Conclusions**

- Implementation of a respiratory scoring system for acute viral bronchiolitis is practical in a diverse improvement collaborative including both academic and community hospital settings.
- Respiratory scoring is a useful tool for decreasing utilization of bronchodilators for patients admitted with acute viral bronchiolitis.

**Acknowledgements**

- This study was supported by the Value in Inpatient Pediatrics Network of the AAP Quality Improvement Innovation Networks (QuIIN).